British TELECOM Journal

Summer 1983 Volume 4 Number 2
Price to BT staff 36p

Telecom 83

Special preview
see pages
15–17

Making light conversation on the phone.

Working at the speed of light is nothing new for Plessey.

Plessey scientists, designers and engineers have been developing new fibre optic telephone transmission for over a decade, combining the technologies of digital multiplexing, line systems, opto-electronic devices and optical fibre connectors to create optical fibre transmission systems second to none.

Plessey was responsible for the first optical fibre test route in Britain–between Maidenhead and Slough.

And completed the 17km cable for British Rail between Birmingham International and Coventry in 1981 –the first UK optical link operating along electrified track to meet international telecommunications standards.

In 1982 they opened the longest link in Britain – the 204km between London and Birmingham.

258 systems, or more than 55 per cent of all optical fibre systems ordered by British Telecom for installation in the UK public network, have been awarded to Plessey Telecommunications Limited. 14 have already been completed and are carrying traffic.

And in Saudi Arabia, Plessey has been awarded the subcontract for the supply of 34MBit/s terminal and line equipment to the central region of the Saudi Consolidated Electric Company.

To find out more, contact: Transmission Division, Plessey Telecommunications Limited, Beeston, Nottingham, United Kingdom, NG9 1LA.
Tel: Nottingham (0602) 254831, Ext. 3542. Telex: 37201.

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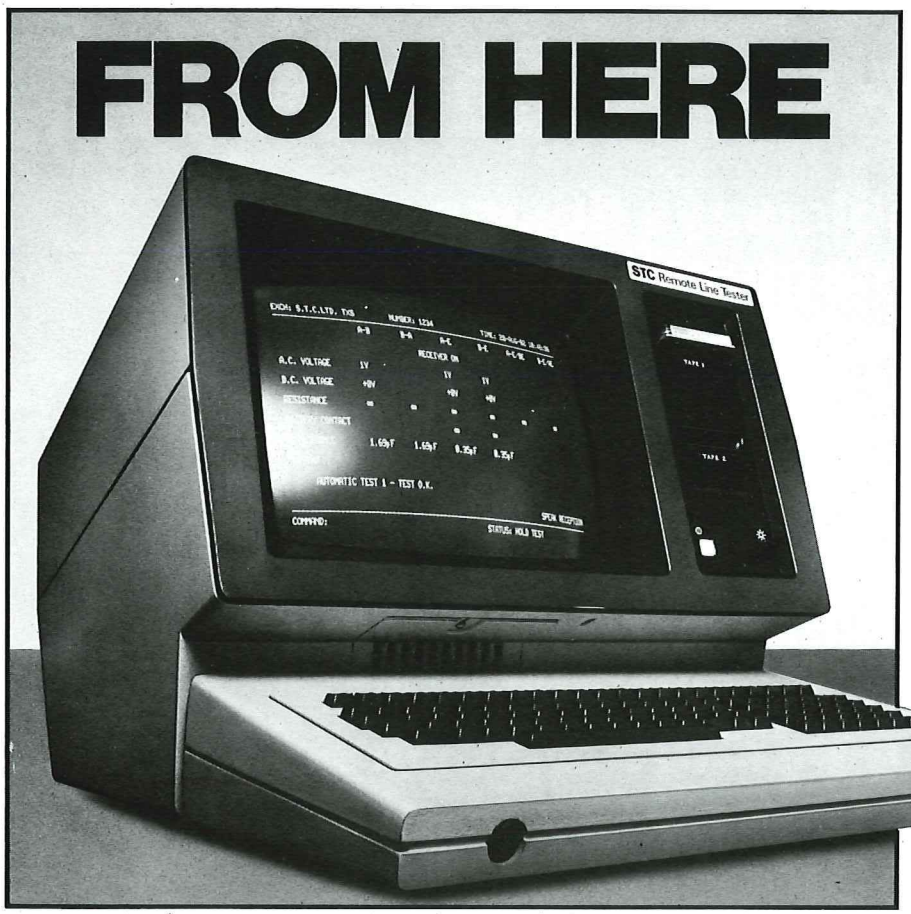

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CAN CHECK SUBSCRIBER'S LINES REGARDLESS OF DISTANCE.

From London to Edinburgh.
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Or from Clapham Common to Tooting Bec.

STC's new RLT, or Remote Line Tester, can locate and identify faults on a subscriber's line or telephone (even coinboxes, or subscriber's private meters), from any distance via the telephone network regardless of transmission medium.

Automatic routining facilities can take place overnight by simply programming the central controller.

This operates on a network of unmanned Remote Units in telephone exchanges in the test areas.

Moreover the RLT has a print-out facility available on demand for all lines falling outside of pre-set BT standards.

The logical sequence of operations with STC's RLT means that little retraining of test operators is needed.

British Telecom set STC the problem of designing equipment which would improve the efficiency of STC's universally used machinery.

And the STC's Remote Line Tester was the answer.

If you would like to know more about the STC RLT, please ring us on 01-368 1234, or write to:
STC Telecommunications Ltd,
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London N11 1HB.

STC

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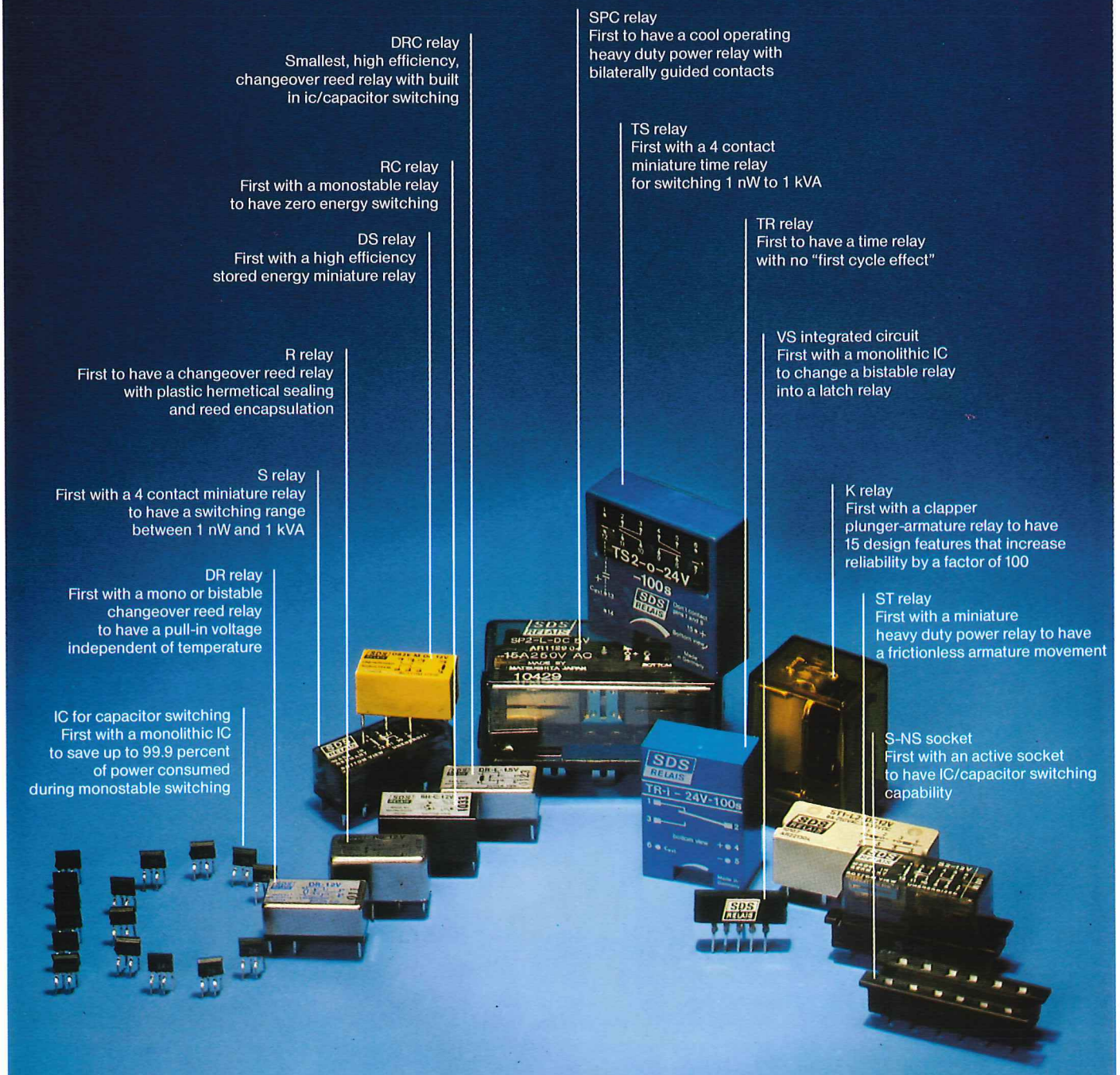

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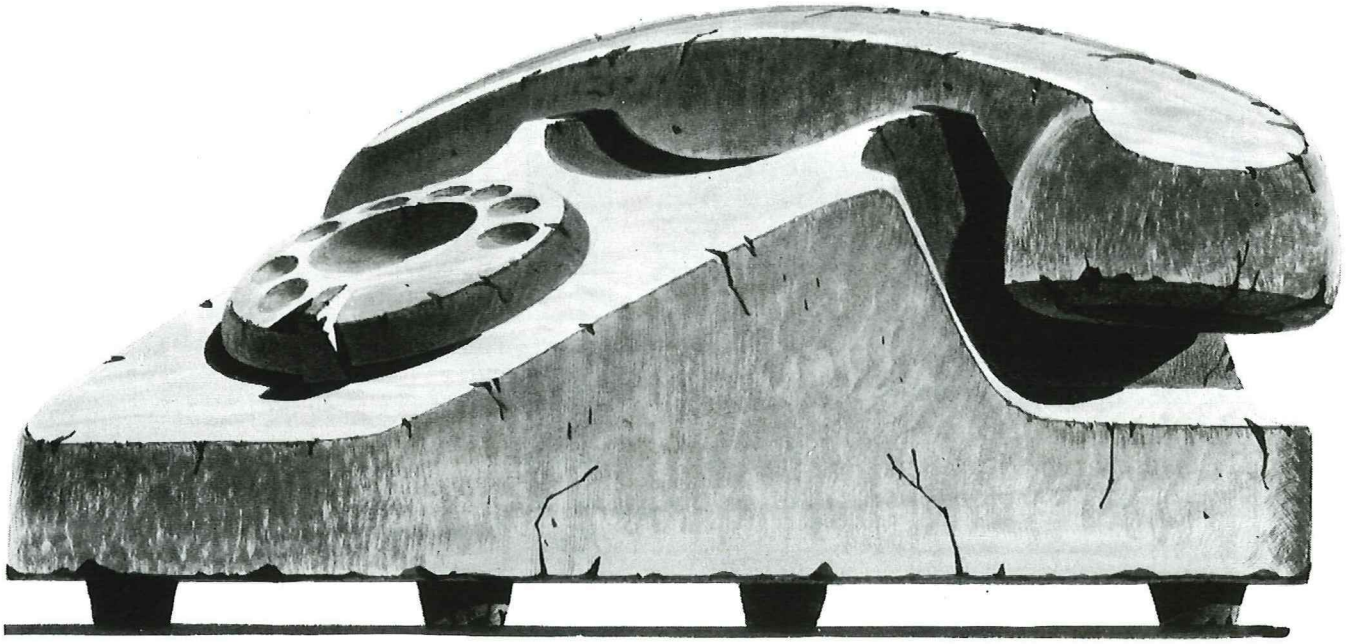

It's 1983. Has anyone told your telephone?

Your telephone is so much a part of your business that it's very unlikely you've stopped to consider it.

And chances are your telephone system is operating in much the same way as business telephones have for twenty years.

So you may not be aware of just what a modern system could do for you.

We're Thorn Ericsson. One of the market leaders in communications.

We make and sell a range of business telephone communications systems that use the very latest technology. From relatively small units with ten lines or less to massive 12,500 line exchanges capable of handling speech and data simultaneously at ultra high speed.

They have one thing in common.

They all add value.

So much so that they will pay for themselves very quickly indeed. In greater efficiency. And substantial savings on your phone bill.

You'll find a superb example in our Diavox 824 System. An electronic office communication system that brings the latest in business efficiency to the smaller company.

You can use Diavox 824 as a straightforward operator-controlled system.

As a key system with no operator. As an executive/secretary system. As a call distribution system. Even a combination of these.

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We believe, however, we can show every business how our telephone systems can make a positive difference to the way it works.

One that can be measured in £s.

The coupon is the first step.

APPROVED for use with telecommunication systems run by British Telecommunications in accordance with the conditions in the instructions for use.

To: THORN ERICSSON Ltd., Viking House, Foundry Lane, Horsham, West Sussex RH13 5QF.

Please tell me more about the 12 line 24 Extension Diavox 824 System ☐ Internal Direct Speech Intercom Systems ☐ Larger PABX Systems ☐ Staff Location Systems ☐

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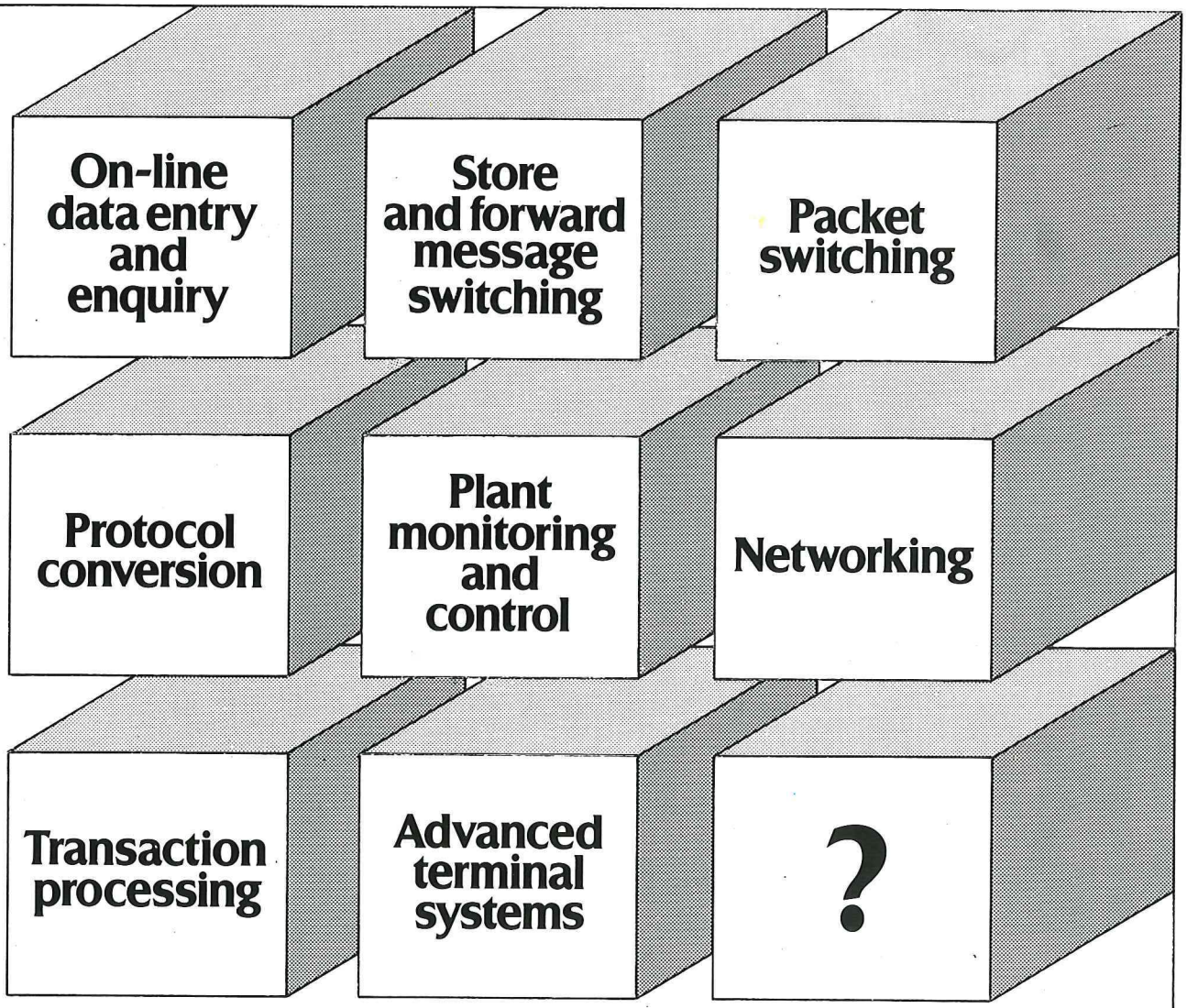

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Ferranti deliver on-line data entry and enquiry, store and forward message switching, packet switching, protocol conversion, plant monitoring and control, networking, transaction processing, advanced terminal systems and more.

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Take the new 6960 Power Meter from Marconi Instruments for example.

With the 6910 sensor specially calibrated for cal factor and linearity, it provides unrivalled accuracy, speed and sensitivity of operation. In addition, it also incorporates a comprehensive range of built-in features that enable even the most complex measurements to be taken at the press of a button.

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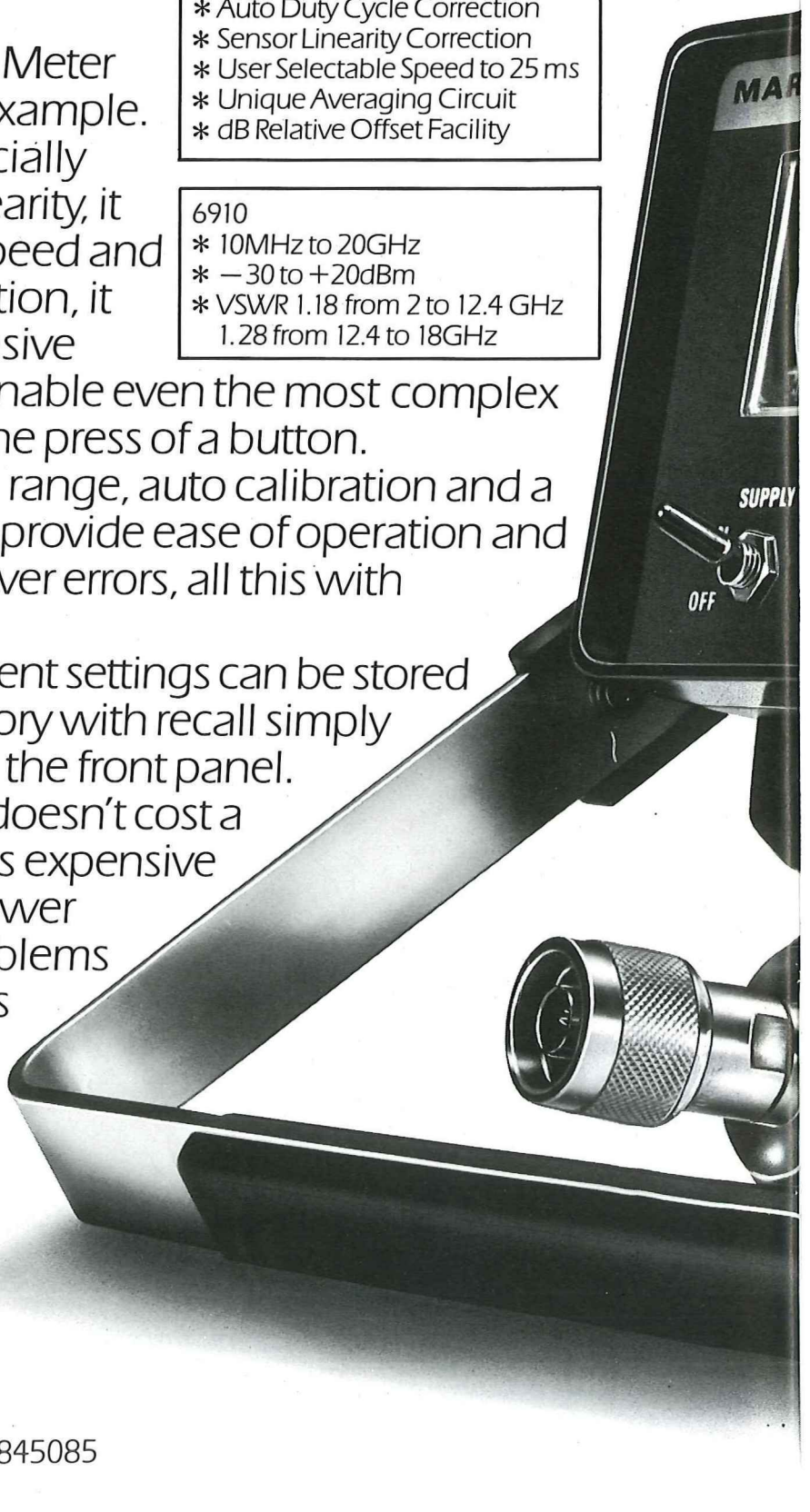
Up to 9 complete instrument settings can be stored in the 6960's non volatile memory with recall simply a matter of depressing a key on the front panel.

And such sophistication doesn't cost a fortune. The 6960 is actually less expensive than many of those old style Power Meters that create as many problems as they solve. And other sensors will be available soon.

Why not call for more information today?



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TELECOM 83
STAND 2·173

CASE DCX 850
Multinode switching multiplexer

DCX 850 is a true multinode switching multiplexer, capable of operating synchronously or asynchronously. When DCX 850 is installed at the nodes in your network any designated user can access any port or terminal connected to DCX – simply by entering a mnemonic address. DCX supports from four to a staggering 61,000 channels for the largest international networks.

Full networking facilities

Auto-rerouting: should a line fail DCX 850 will automatically find an alternative data path, and provides end-to-end diagnostics and full error protection.
Load balancing: optimising the use of computer resources.
Port selection: providing the user with access to more than one computer.
Contention: where the number of terminals exceeds the number of computer ports.
Protocol handling: IBM or X25, for example.
Protocol conversion: allowing different terminal and computer types to be connected, regardless of protocol.

X25 packet switching

CASE DCX 850 gives you complete control of your network, from central X25 packet switching node to remote statistical multiplexer or X25 pad. It can also link with the CASE MSX message switching system for access to the worldwide telex network, and to CASE Grapevine Local Area Network.

CASE SERIES DCX
As easy as making a phone call

CASE is represented by a worldwide distributor network.
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PLUG-IN TO AMPHENOL

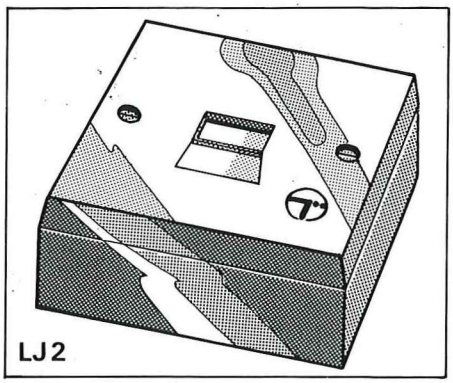
LINE JACK UNIT 2 & 3 * The plug-in concept is now adapted for use on all new approved telephones and will use the new 6-way Jack. LJ2 is designed and approved to BT Spec S1552 and is available as a surface mount. LJ3 is designed and approved to BT Spec S1553 for use with standard BS 4662 Box Fittings and is available as surface or flush mount.

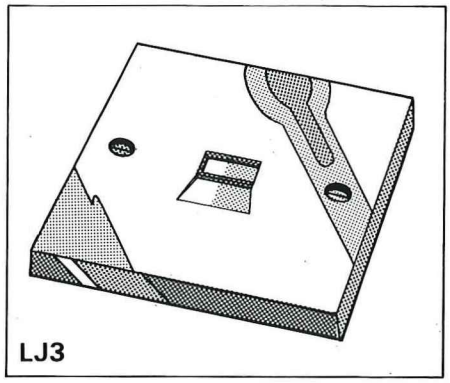
LINE JACK UNIT 4 & 5* are surface or flush mount, designed for use with standard BS Box Fittings. Line Jack Unit 4 is designed and approved to BT Spec S1554 and has two separate circuits whereas Line Jack Unit 5 has dual socket outlets. Jacks are wired in parallel to BT Spec S1555 and will use the new 6-way Jack.

LINE JACK UNIT 6 has been specifically designed for office furniture and trunking systems, using the latest BT approved components. The unit can be easily fitted by simply press fitting into a prepared panel 'cut out'. Mastering facilities are available on request.

LJ7B SIX SOCKET OUTLET (Designed for round or flat incoming cables) Master unit with BT 226 connector to couple to incoming cable, six telephone jack sockets and printed circuit board providing six independent master circuits, each with gas discharge tube, bell capacitor and line-test resistor. Individual circuits may be diconnected by removal and storage of a simple connector.

*Circuity to measure line impedance to ascertain function of circuits with or without the telephone instrument connected is incorporated


LJ2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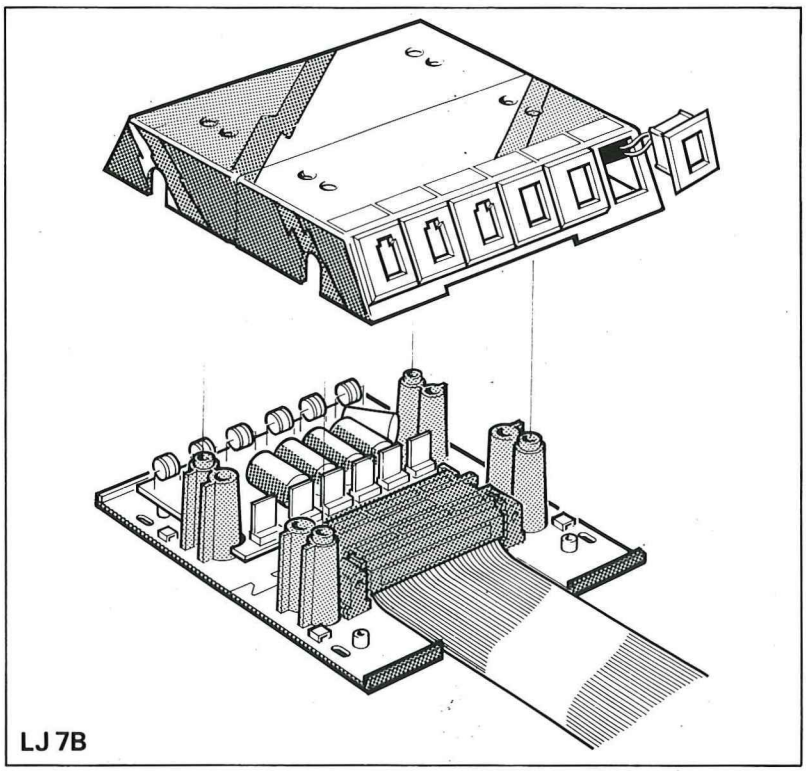
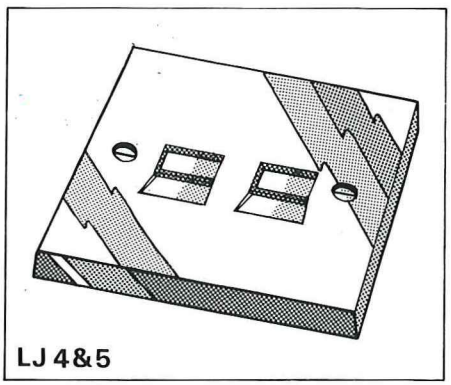
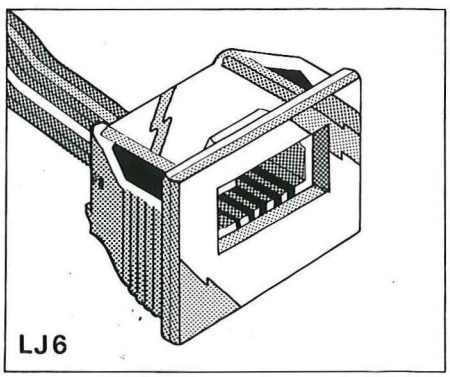

LJ 7B


LJ 4&5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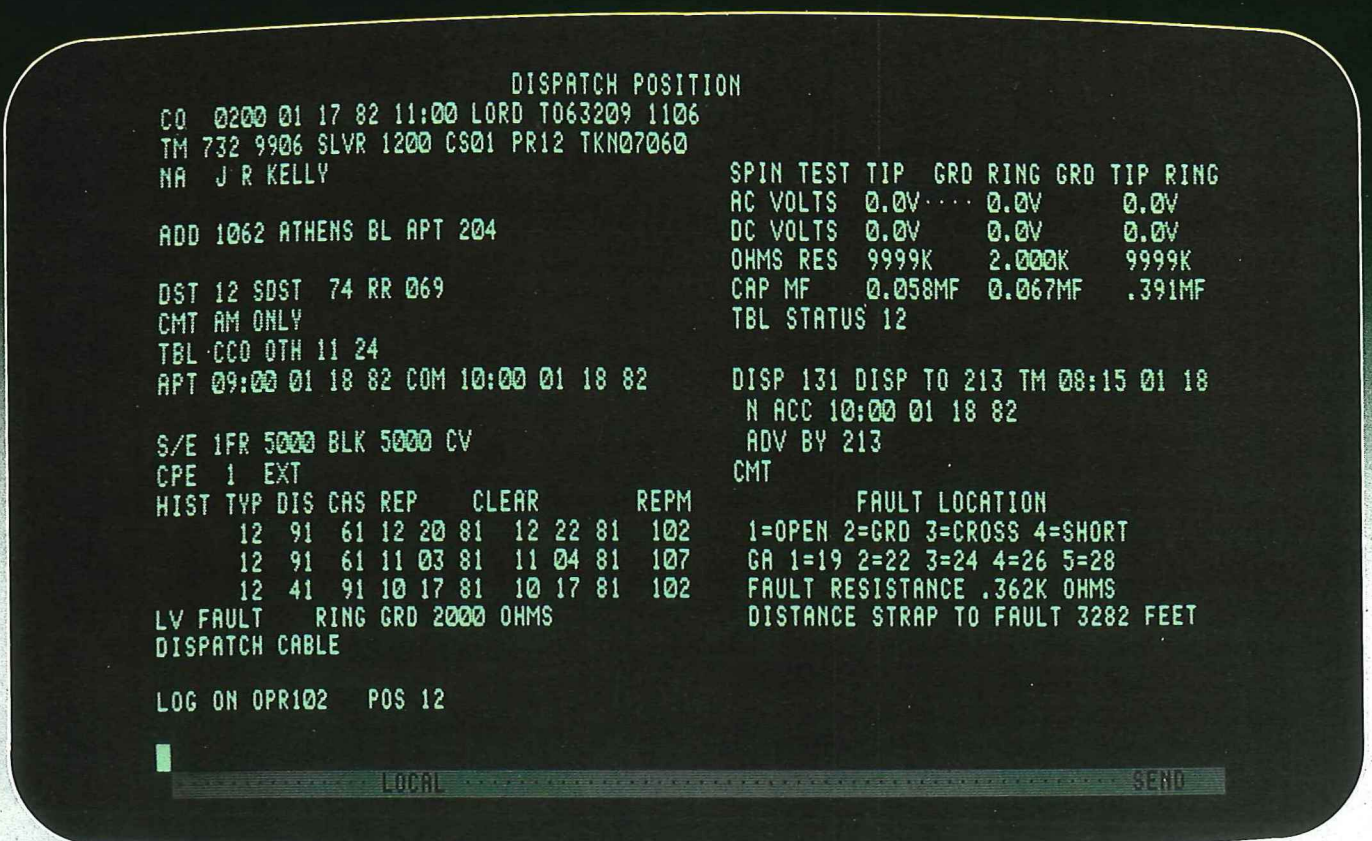
LCR 2000 is highly flexible, readily adaptable to any Repair Service Centre operating procedures, and is simple to use, requiring minimal operator training.

For the complete facts on LCR 2000, and more information on the benefits of automated Repair Service operations, contact: Philip G. Moore, Director of Systems Sales, Porta Systems Ltd., The Parade Frimley Surrey GU 16 5HY. Telephone (0276) 683140



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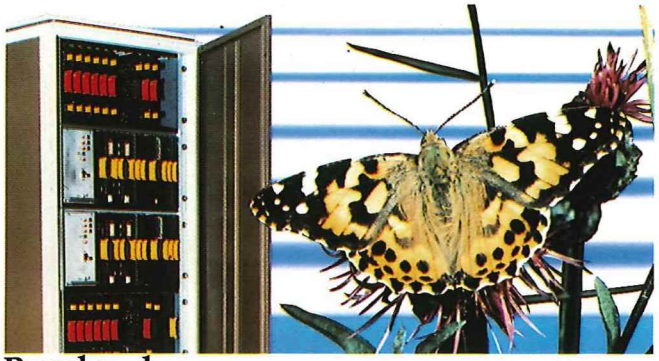
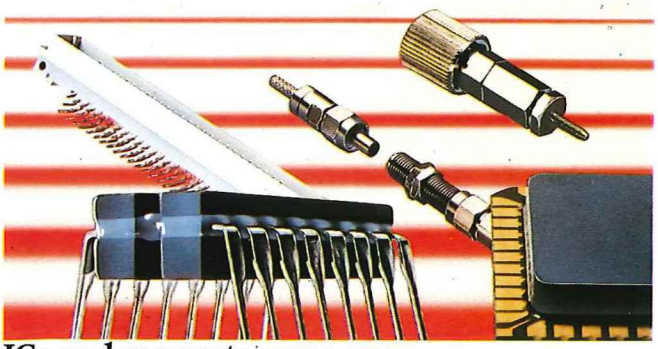
Office of the future

Business exchange



Rural exchange



ICs and connectors

Fibre optics

Data networks

The whole telecoms picture will be there–on the Plessey stand at Telecom 83.

See Plessey digital systems expertise–in the Plessey IBIS integrated business information system for the office of the future, and the third-generation Plessey IDX private business exchange.

Learn about the key role Plessey has in System X for British Telecom's public network. And the Plessey UXD5 rural exchanges.

Total telecommunications at Telecom 83

Stand 4.88

Get new Plessey answers in 30-channel PCM, multiplexing, line equipment–in packet switching, telex, teletex and corporate data networking–in radio systems, connectors, ICs. And see why more than half the optical fibre system contracts for the UK network have been awarded to Plessey.

Get the total Plessey story, at Telecom 83.

The Plessey Company plc, Edge Lane, Liverpool, United Kingdom L7 9NW.
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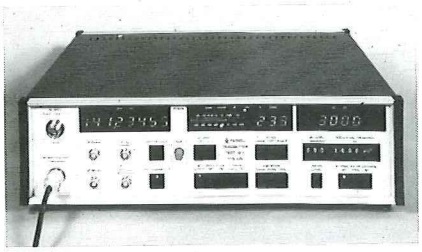
TELECOM 83

test equipment



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We also supply:

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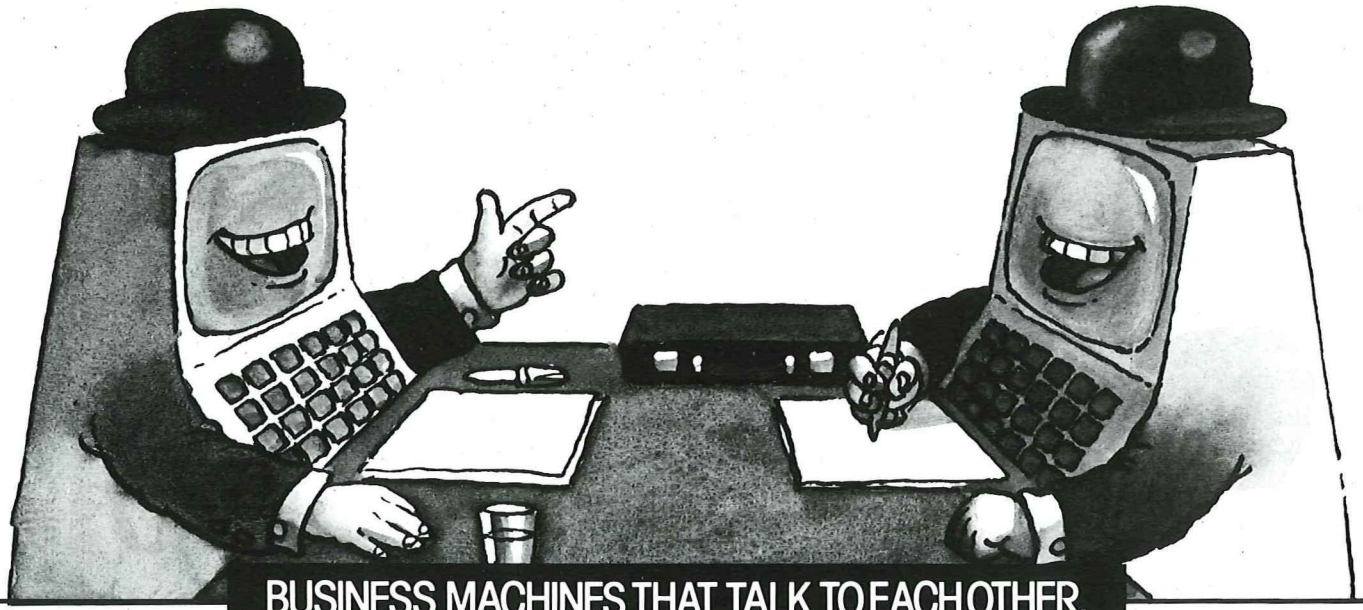

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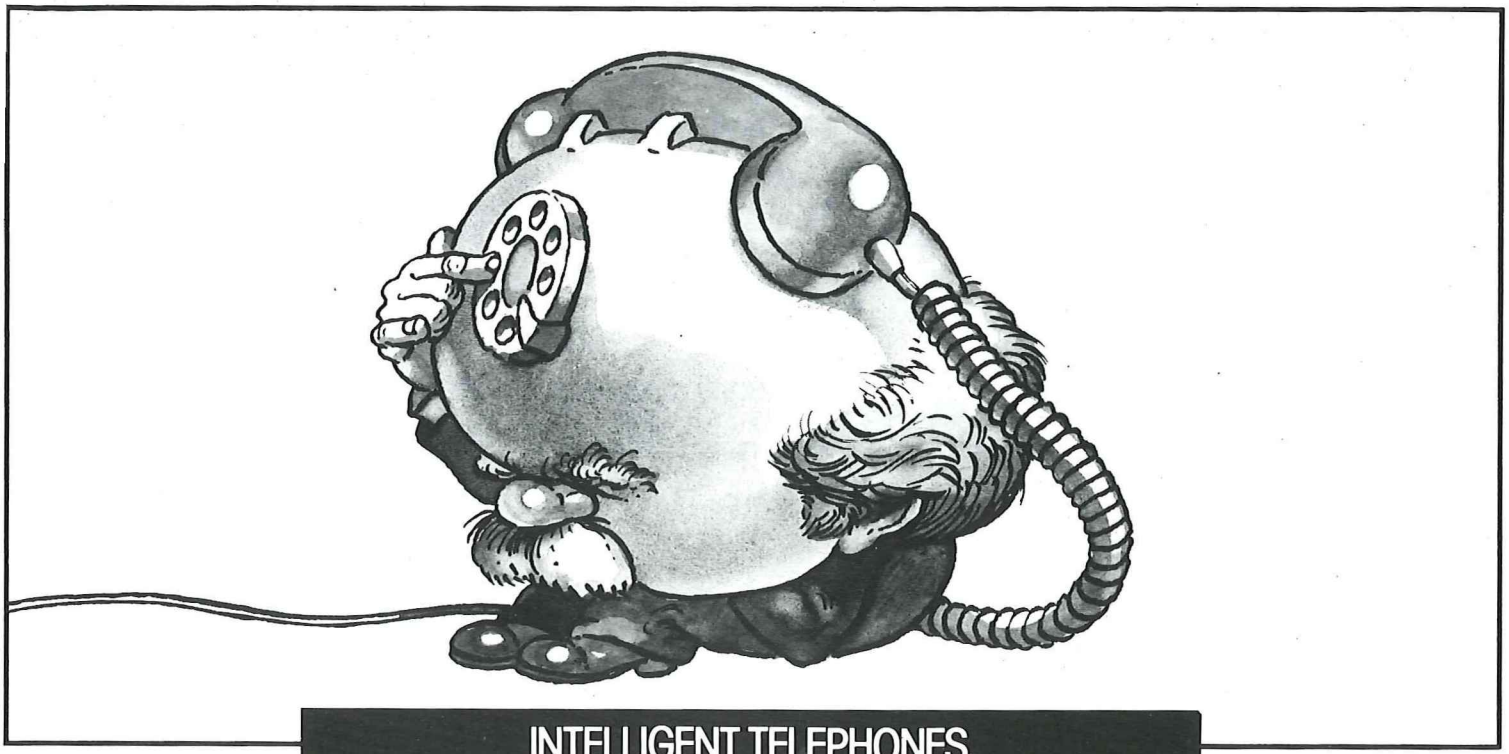
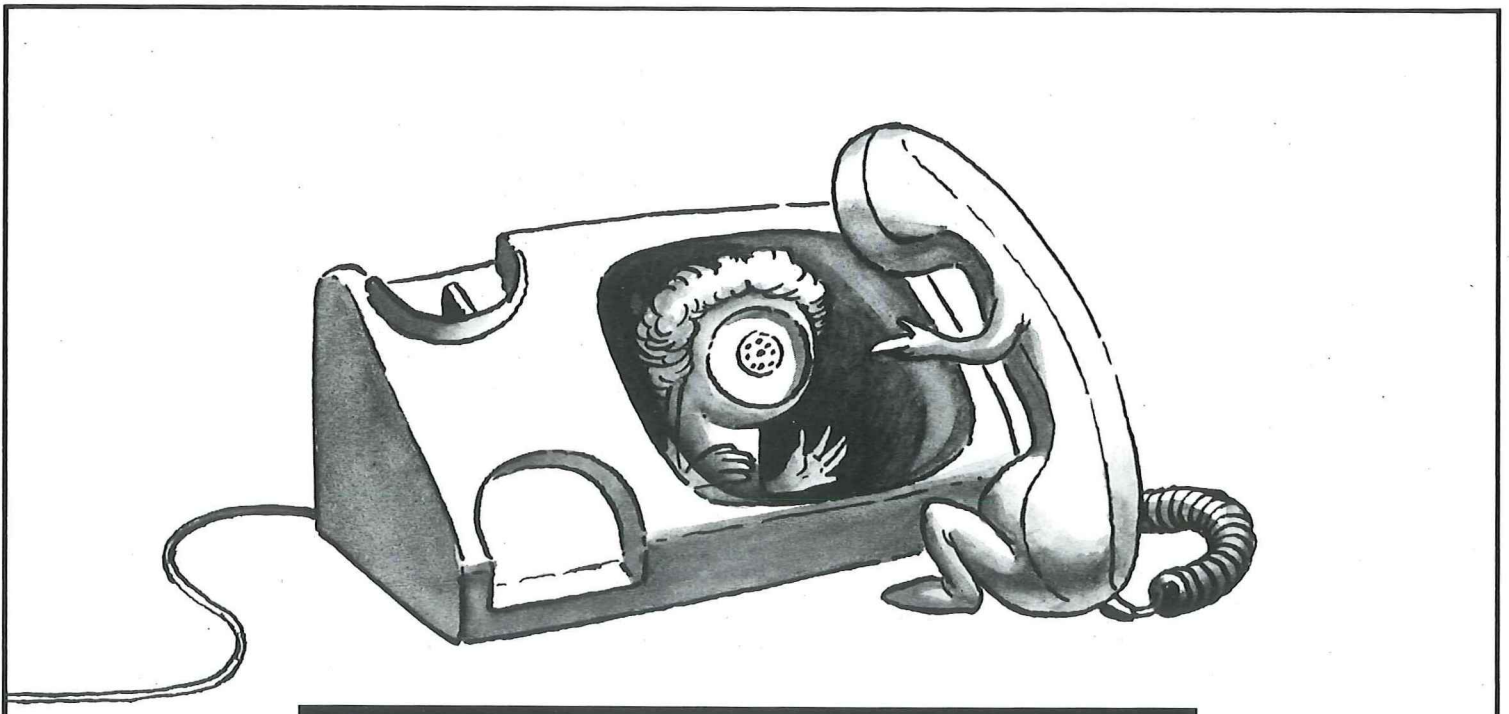


INTELLIGENT TELEPHONES.



VIDEO TELEPHONES.

Telecom '83 you can see them while they're still remarkable. **STC**

For more information, contact Peter Prowse, STC House, 190 Strand, London WC2R 1DU. Tel: 01-836 8055.

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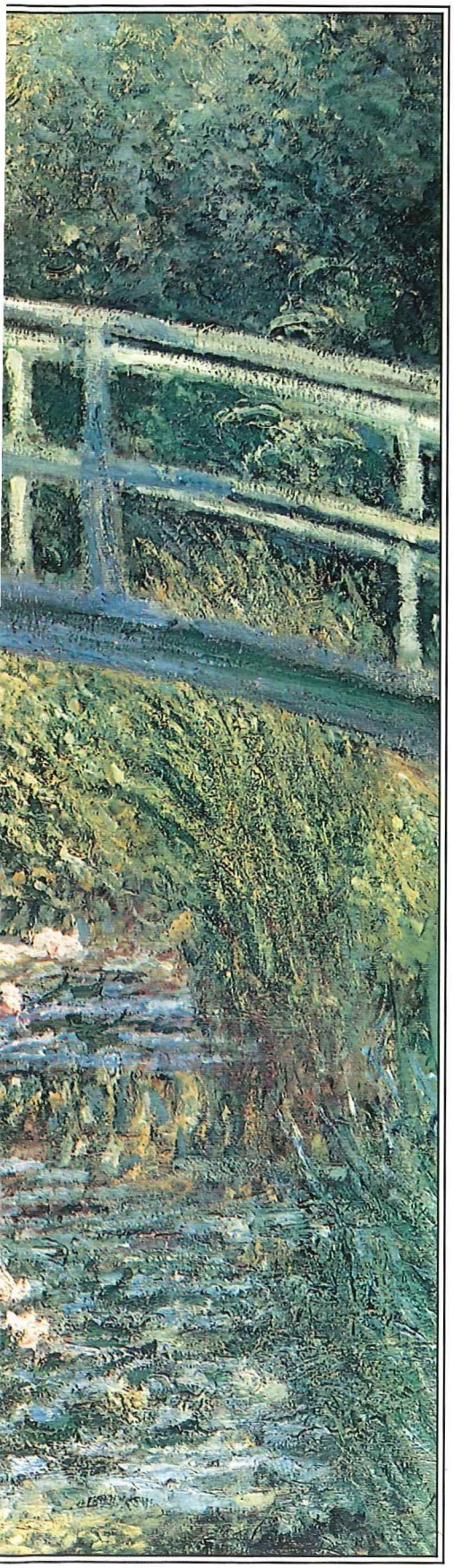
OF MASTERING LIGHT.



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The science of optical communications.
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That's why we've been involved in the world's greatest achievements in the field of optical communications. And why we're sure to have the resources and capability to meet your requirements too.
For full details, phone us on 051-430 3142 or write to us at the address below.

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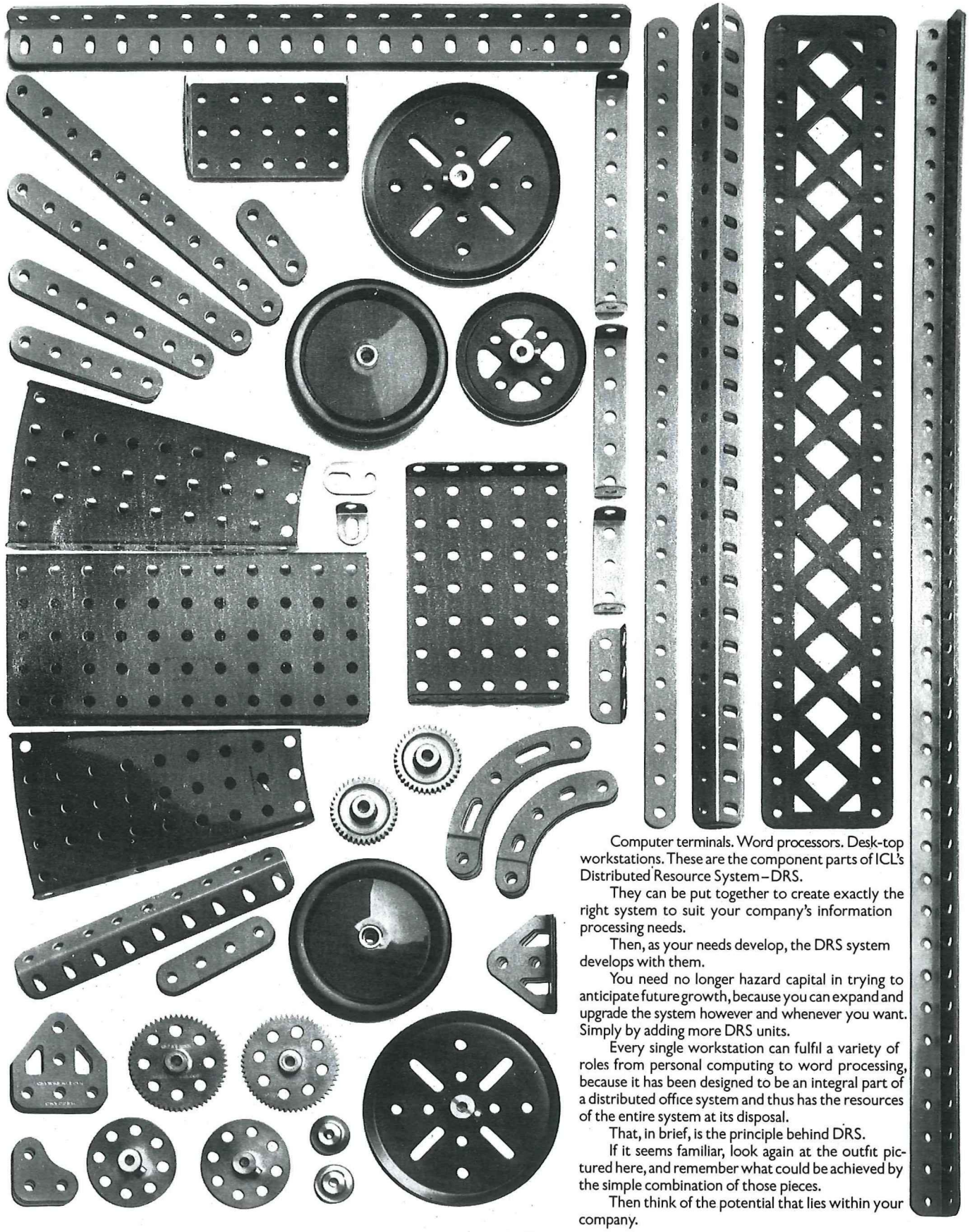


Computer terminals. Word processors. Desk-top workstations. These are the component parts of ICL's Distributed Resource System – DRS.

They can be put together to create exactly the right system to suit your company's information processing needs.

Then, as your needs develop, the DRS system develops with them.

You need no longer hazard capital in trying to anticipate future growth, because you can expand and upgrade the system however and whenever you want. Simply by adding more DRS units.

Every single workstation can fulfil a variety of roles from personal computing to word processing, because it has been designed to be an integral part of a distributed office system and thus has the resources of the entire system at its disposal.

That, in brief, is the principle behind DRS.

If it seems familiar, look again at the outfit pictured here, and remember what could be achieved by the simple combination of those pieces.

Then think of the potential that lies within your company.

ICL's distributed office systems are now available in a variety of outfits.

DRS MODEL 10
An intelligent workstation which can be integrated in a DRS MICROLAN local network, accessing and manipulating data.

DRS MODEL 20
A desk-top workstation with twin 1 Mbyte integral discs that can run alone or be linked via MICROLAN. It can also communicate via Wide Area Networks with ICL and IBM mainframes.

DRS MODEL 25
Shares the same features as a Model 20, with integral fixed and floppy discs of 10 and 1 Mbyte. It can also form its own local network, supporting two Model 20s or Model 10s.

DRS MODEL 50
A desk-style unit with the systems cabinet housing a 1 Mbyte diskette and a single fixed disc of 16 or 27 Mbytes. It can support any mix of Model 10, 20, 25, 40 and 50 systems.

DRS 8800 SERIES
It can function as a stand-alone word processor. Or it can function as one of a number of secretarial workstations, supported by the DRS Document Storage System.

For more information, dial 100 and ask for Freefone ICL. Or send coupon to ICL Infopoint, ICL House, Putney, London SW15 1SW.

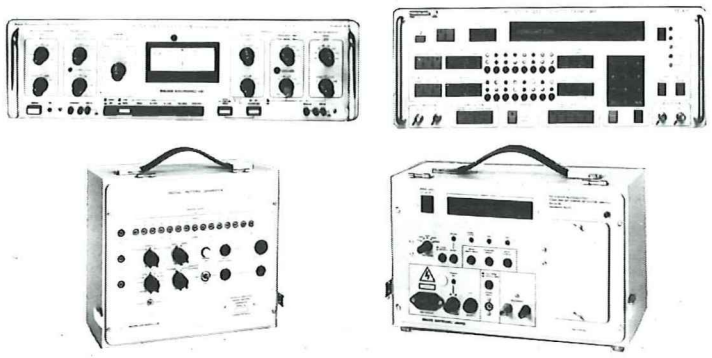
Name_____ Position_____

Company_____ Address_____

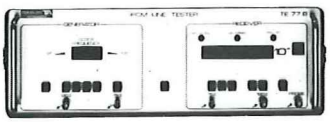
We should be talking to each other. ICL

MALDEN & TEKELEC
CAPABILITY IN TELECOM TESTING

2 Mbit/s PCM



8 Mbit/s PCM



34 Mbit/s PCM

Data/Protocol Analyser – Simulators for Asynchronous and Synchronous Communication, 50-128 Kbit/s. SNA/SDLC/BSC/HDLC/X25 etc.

There is almost no limit to the variety of telecom and data transmission test conditions, which can be met by Malden and Tekelec. Our equipment is designed to meet the requirements of major Authorities throughout the World, and we are continually proving our capability through innovation. New instruments are currently being developed, a Data Communication Protocol Analyser-Simulator will shortly be announced.

We provide a dedicated technical service, and will be pleased to send detailed information on any of our products.

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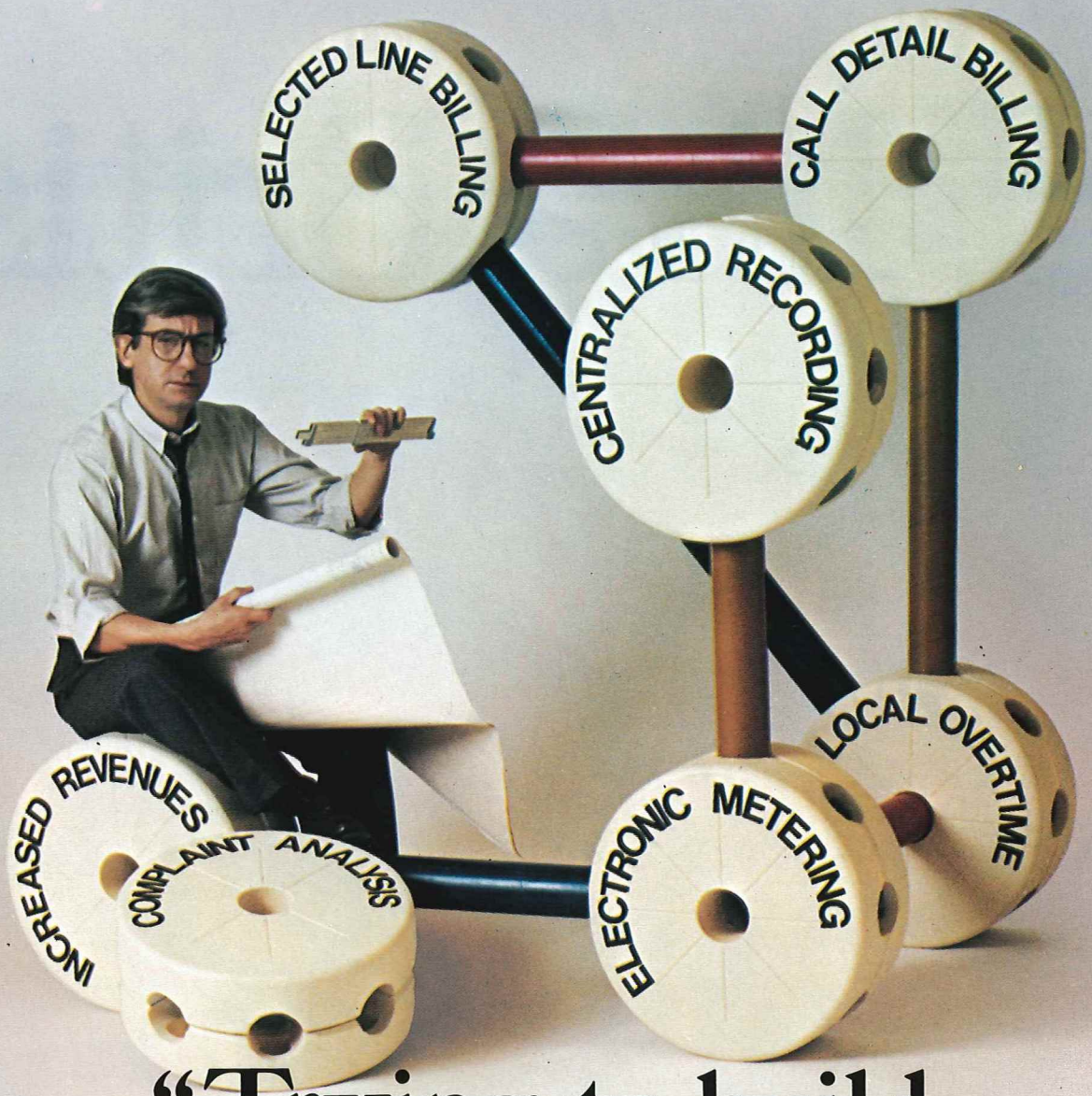

"Trying to build the perfect billing system?"

How can a telephone operating company offer selected line detailed billing, minimize subscriber complaints, insure against data loss, improve accounting functions and solve a host of other billing problems more easily than ever before?

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It can scarcely be a coincidence! Just as British Telecom National Networks reaches any part of the UK with all the facilities business needs, quickly and efficiently, and has round-the-clock, seven-days-a-week back-up – so British Telecom International will provide you with private leased circuits to the UK which can be "switched" through to any part of Europe and connect with any public network.

This is true whether you need a single private circuit for telephone speech or a complex international network for high-speed transmission of data, facsimiles, text and speech – or anything in between.

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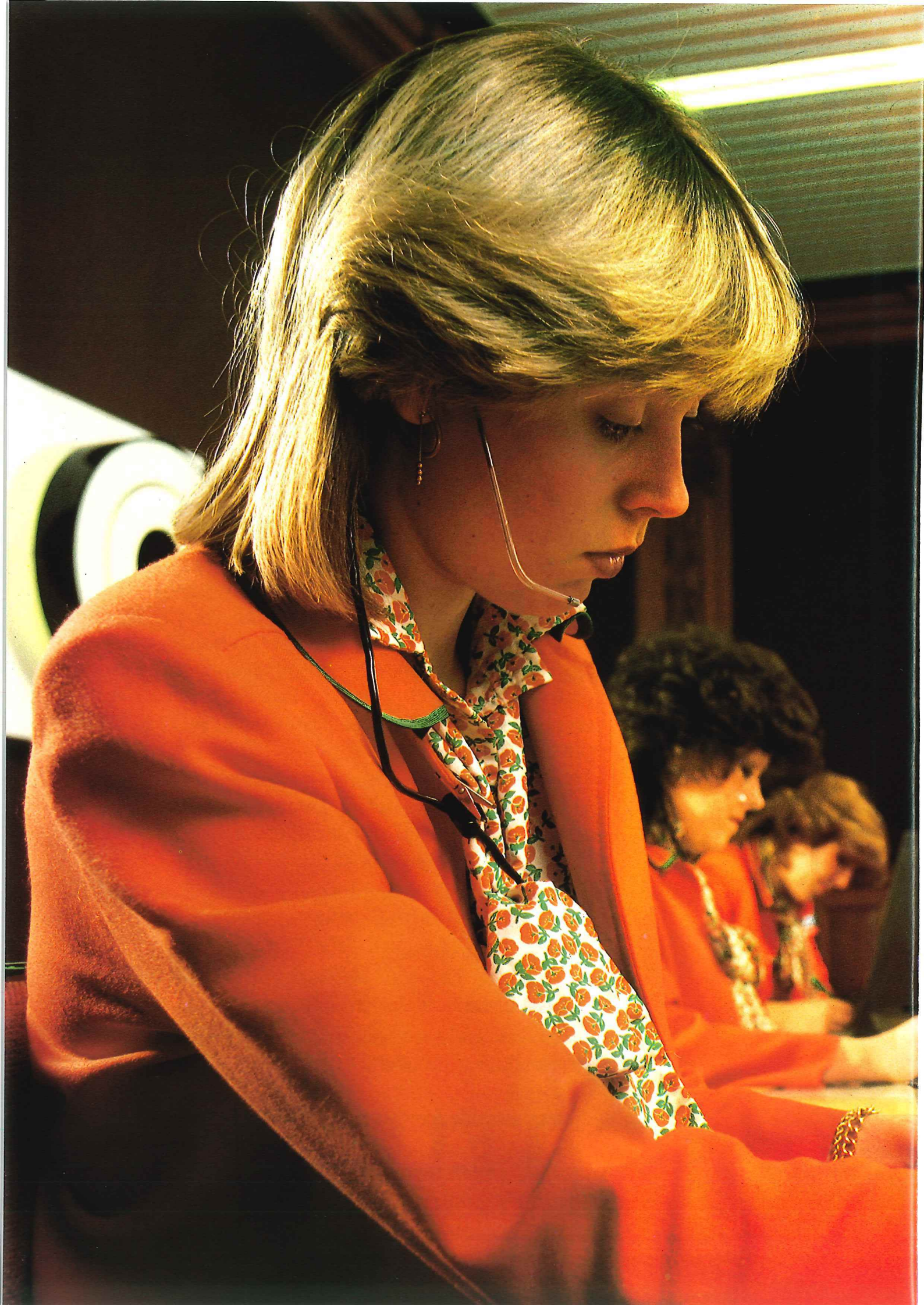

"Auralite telephone headsets mean maximum efficiency, comfort and mobility."

"We cannot settle for less."

David Hardman, Deputy Managing Director, Godfrey Davis Europcar.

Godfrey Davis Europcar is Britain's biggest car rental company and relies on efficient communications. Its Central Reservations office receives hundreds of car rental reservations by telephone every day, and personnel morale and comfort are essential in maintaining the high standards of speed and efficiency which both the company and its customers expect.

That's why David Hardman sees that all of the Godfrey Davis Europcar tele-sales assistants in the Reservations office at their head office in Bushey, Herts are equipped with Auralite telephone headsets.

"The tele-sales assistants' task is a demanding one" says David Hardman. "The ultralight headsets reduce fatigue. Their superior sound quality is very much better than that of a carbon headset and, as it conveys sound direct to the ear, surrounding sounds do not confuse the listener."

If the telephone plays a significant role in your business, Auralite headsets can make it more efficient, your clients happier, and your personnel a lot more comfortable.

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APPROVED for use with telecommunication systems run by British Telecommunications in accordance with the conditions in the instructions for use.

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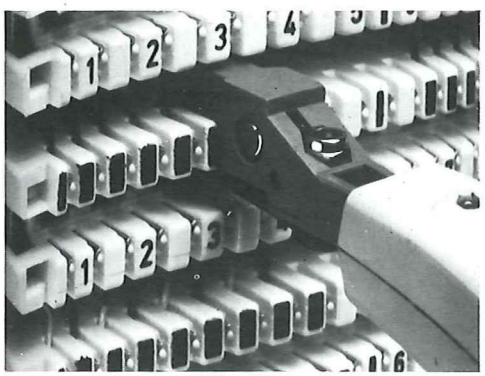

Let's be fair — the collection at the top of the page is perfectly O.K. for many jobs — but when it comes to connecting wires in a telecommunications system the one at the bottom, the unique KRONE-LSA-PLUS Quick Connexion System, replaces the lot.

It's faster, more efficient and completely foolproof.

To find out more about the remarkable KRONE-LSA-PLUS Quick Connexion System and the other products in our range of telecommunication supplies — just phone, write or telex — and we'll get you up-to-date in no time at all!

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Telex: 43350

British Telecom Journal
Summer 1983 Volume 4 Number 2

Published by British Telecom to promote and extend knowledge of the operation and management of telecommunications.

Cover: Using a purpose-built electronic locator, British Telecom engineer Sam Ward can pin-point buried telephone cables in the Humber estuary. The cables provide vital links to Spurn Head where the country's only permanently afloat lifeboat awaits the call for action.

British Telecom Journal costs 36p per issue for staff. External subscribers pay £10 for two years including post and packaging. Full details on page 44.

A year of change

In a year dominated by change both in terms of developing competition and Government proposals to turn British Telecom into a public limited company, its trading performance, together with the range and quality of services it offered, had proved generally satisfactory.

That was the message from chairman Sir George Jefferson, commenting on the financial year 1982/83 during which turnover increased from £5,708 million to £6,377 million. Although profit for the year at £365 million was £93 million down on 1981/82, it still represented a return of 5.8 per cent on capital employed at replacement cost and was up on the target figure of 5.5 per cent.

This had been achieved during a period when there had been no increase in charges to customers for main services since November 1981: indeed, there were some substantial decreases in trunk and international charges. Main reason for the decline in absolute profits was the increase in depreciation charges continuing the process of adapting the accounts to reflect more accurately the new competitive and technical environment.

Improved cash flow during the year arising from lower-than-forecast inflation, lower interest rates, the more efficient use of capital and continued improvement in reducing costs by efficiency, meant that there was no need to call on the borrowing facility of up to £310 million approved by Government. Interest paid on existing Government loans totalled £302 million.

Additional turnover due to business expansion and from increasing volumes of sales of items previously rented, was £329 million. This was achieved despite a reduction during the year of 5,671 staff mainly through natural wastage and early retirement.

Sir George said that British Telecom had continued to develop in the way necessary to respond most effectively to customer needs and to meet the growth of competition. It was satisfying that the three operating divisions within British Telecom – Inland, International and Enterprises – were all trading profitably.

The splitting of Inland Division into Local Communications Services and National Networks was a major step in developing the profit centre concept, decentralising decision taking and reflecting both the needs of customers and the growing effect of competition on these mainstream sectors of business.

The principal effort of Major Systems Division had been the rationalisation and acceleration of the programme to modernise exchanges. System X remained the backbone of this programme and its development and deployment during the year had confirmed the belief that it was a highly effective and world competitive product. International services continued to be among the finest in the world reflected in the fact that many multi-national companies had chosen to locate their European communications hubs in the UK.

In purely business terms, future prospects were encouraging with telecommunications benefiting from an upturn in the economy as well as the expansion into a variety of new services and products including cable television. With regard to the future of British Telecom itself, Sir George said he hoped that much of the uncertainty had ended with the general election. The Bill to turn British Telecom into a public limited company was likely to be on the statute book by early next year and already much had been done to turn British Telecom into a prosperous company whether in the public or private sectors.

Accounting for all calls

Mandy Knight and Les Pikett

Since June, thousands of customers in the Bristol area have been receiving quarterly bills with itemised statements of all trunk and international calls.

Graham Mockridge, a clerical officer from the dialled call itemisation group, monitors the status of the exchange-based subscriber recording system terminals on a visual display unit in the subscriber billing complex based in Bristol's Telephone House.

System manager John Maynard threads a tape on to the computer to begin the job of extracting billing information collected and stored on the system's disc drive.

Even when System X was being designed some years ago, it was clear that more and more customers wanted details of the charges which go to make up the telephone bill. As a result, the facility to itemise dialled calls on request was incorporated, and with improvements to the computerised telephone billing system, details of calls would be sent to customers at regular intervals.

Because System X will take some time to be widely introduced, however, it was decided to see whether similar information could be provided for customers connected to existing exchanges.

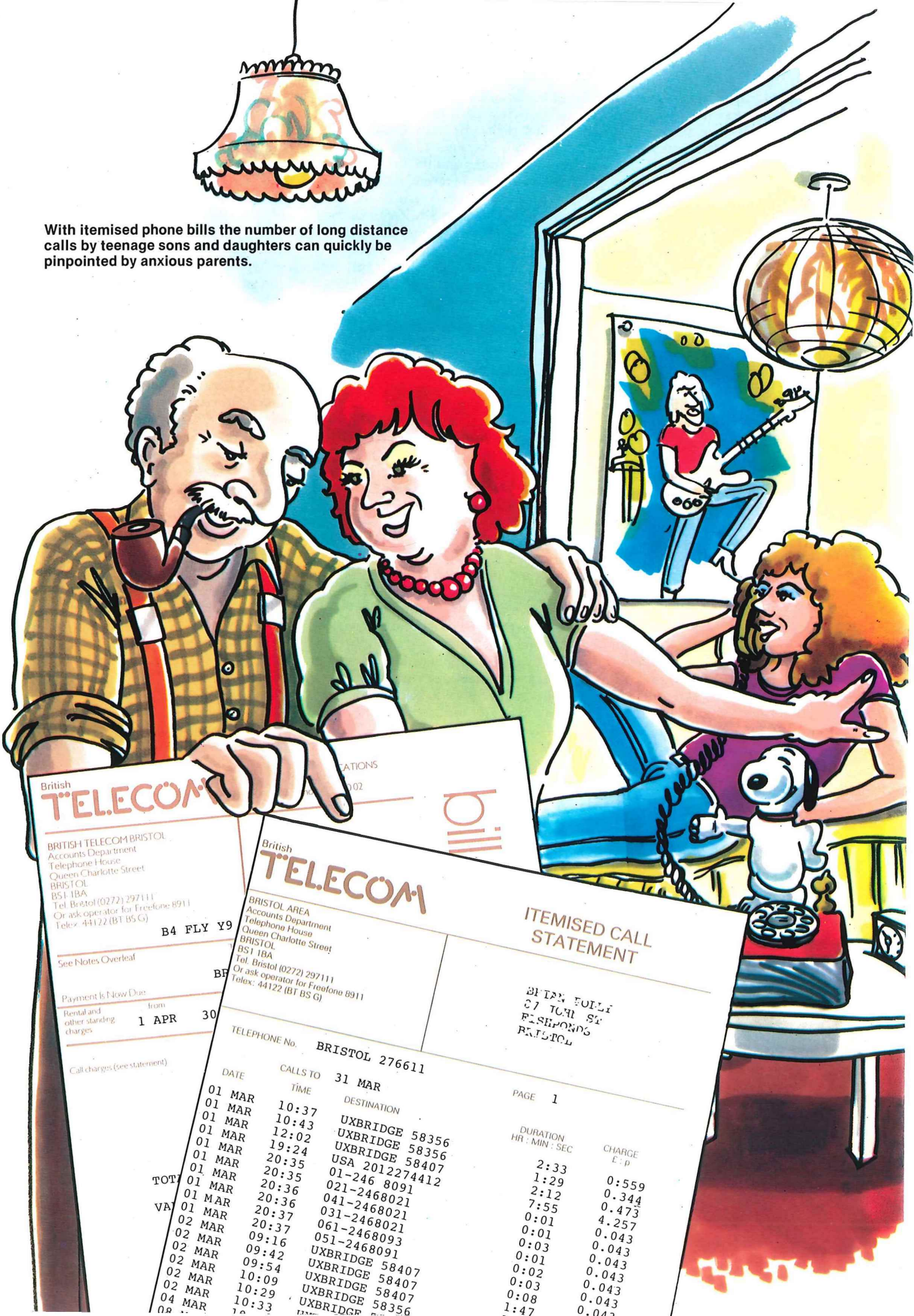
Work began with a survey to discover whether any proprietary equipment was suitable for fitting into existing exchanges without interfering with customer service or affecting metering. Only two firms, both American, could offer likely equipment, but after laboratory tests it was clear that neither was really suitable without extensive modifications.

At this stage, one company withdrew but the other firm – TeleSciences Inc – made the changes. Six of the modified units were bought for a field trial and were installed at some exchanges in London's South East Area. Units varied in size from 50-line through to 600-line.

Customers on these exchanges were canvassed for volunteers, and eventually about 1,200 were connected. Each was asked to keep a record of all the calls made from their line and to compare their own records against listings produced by the TeleSciences equipment. All calls monitored by the TeleSciences units were also studied, in parallel, by independent equipment and then cross-checked.

Following this and further work, the possibility of introducing a pilot trial in Bristol Telephone Area to offer customers an optional, chargeable service providing full details of all trunk and international calls was considered. Later, the concept was modified to investigate the feasibility of sending customers itemised bills, without charge, in line with United States telephone company policy.

Three exchanges in Bristol Area – Bristol Redcliffe, Bristol West and Bath



With itemised phone bills the number of long distance calls by teenage sons and daughters can quickly be pinpointed by anxious parents.

British TELECOM

BRITISH TELECOM BRISTOL
Accounts Department
Telephone House
Queen Charlotte Street
BRISTOL
BS1 1BA
Tel. Bristol (0272) 297111
Or ask operator for Freefone 8911
Telex: 44122 (BT BS G)

B4 FLY Y9

See Notes Overleaf

Payment Is Now Due

Rental and other standing charges from 1 APR 30

Call charges (see statement)

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Accounts Department
Telephone House
Queen Charlotte Street
BRISTOL
BS1 1BA
Tel. Bristol (0272) 297111
Or ask operator for Freefone 8911
Telex: 44122 (BT BS G)

ITEMISED CALL STATEMENT

TELEPHONE No. BRISTOL 276611

CALLS TO 31 MAR

PAGE 1

DATE	TIME	DESTINATION	DURATION HR : MIN : SEC	CHARGE £ : p
01 MAR	10:37	UXBRIDGE 58356	2:33	0:559
01 MAR	10:43	UXBRIDGE 58356	1:29	0.344
01 MAR	12:02	UXBRIDGE 58407	2:12	0.473
01 MAR	19:24	USA 2012274412	7:55	4.257
01 MAR	20:35	01-246 8091	0:01	0.043
01 MAR	20:35	021-2468021	0:01	0.043
01 MAR	20:36	041-2468021	0:03	0.043
01 MAR	20:36	031-2468021	0:01	0.043
01 MAR	20:37	061-2468093	0:02	0.043
02 MAR	20:37	051-2468091	0:03	0.043
02 MAR	09:16	UXBRIDGE 58407	0:08	0.043
02 MAR	09:42	UXBRIDGE 58407	1:47	0.043
02 MAR	09:54	UXBRIDGE 58407		
02 MAR	10:09	UXBRIDGE 58407		
02 MAR	10:29	UXBRIDGE 58356		
04 MAR	10:33	UXBRIDGE		

Kingsmead – have now been equipped with TeleSciences units, supplied and installed by STC, to provide itemised bills for up to 52,000 customers.

The system can be divided into two separate but inter-related parts, the monitoring equipment in the exchanges and the subscriber billing complex (SBX) computer system in Bristol's Telephone House which controls the complete system.

The monitoring equipment installed in the exchanges are TeleSciences, microprocessor-controlled SRS2000 series subscriber recording (SRS) terminals, handling 1,000 lines spread across five 200-line sub-racks. There are six SRS terminals in Redcliffe, 15 in West and 31 in Kingsmead as well as a 'ready-to-go' spare in each exchange. Every line on the three exchanges is individually connected to a unique SRS input on three wires enabling all outgoing calls to be monitored. Microprocessors in the SRS can identify seizure and cleardown on the line, record dialled digits, and recognise from the initial meter pulse that a call has been answered.

When the call is completed, the dialled digits are compared with decision tables which have been downloaded from the SBX to determine whether the call is local and is to be bulk-billed or whether a full call detail record is required. If the call is identified as local, the SRS will count bulk calls and chargeable units for the originating line and then discard the full call record. With a trunk or international call, the full record will be retained and held in a buffer memory before transmission to the SBX.

Only outgoing answered calls are collected for billing purposes but up to 20 lines on each SRS terminal may be put on service observation enabling full call records to be accumulated for all outgoing answered calls and for all outgoing unanswered calls with two or more dialled digits. In these circumstances, local calls continue to be bulked for billing purposes and the full call record will show this to prevent double billing.

The full call detail record identifies the originating line by SRS input number and gives the seizure time, dialled digits, call set-up time, connect time and observed meter pulses. To keep the billing data secure, each SRS has an active spare sub-rack which automatically takes over the role of any of the other five in the event of a fault. Each also has duplicate system controls, so that, should one fail, data is not lost.

The SBX computer system in Bristol's Telephone House consists of two separate computer systems handling on-line data collection and off-line processing respectively, both based on Hewlett Packard 1000E Series computers. The on-line SBX system operates 24 hours a day collecting data from the exchanges and is connected to alarms at the local repair service centre for out-of-hours attention. Communication between the SBX and SRS terminals uses a network of 18 private circuits, four each to Redcliffe and West and 10 to Kingsmead. The SBX checks the terminals regularly throughout each 24 hour period according to schedules input to the SBX and can operate simultaneously on all 18 lines. The on-line SBX also holds all the information needed to charge for a call based on destination and duration.

As each call is collected, the format and content of the record is validated and charge units are compared with the observed meter pulses. If there is a significant discrepancy between observed and calculated units, or in the event of an initial validation check failure, the call record is highlighted as an error and is directed to a queue where it is physically checked and, if necessary, corrected. There is also a facility for interrogating both bulk and full call detail files.

Collected call data is regularly transferred to the off-line system where it is held until the bill is sent out. The value of unbilled calls are recorded and automatically adjusted each time calls are stripped off for billing. Customer details are kept up to date, with names and addresses printed on statements.

When the time comes to produce the bill, all calls for the lines in question are extracted using a process file number and are priced and sorted into chronological order in originating telephone number order. A tape is sent to the billing computer centre where customers' bills are produced and despatched, although it is possible to print statements locally if necessary.

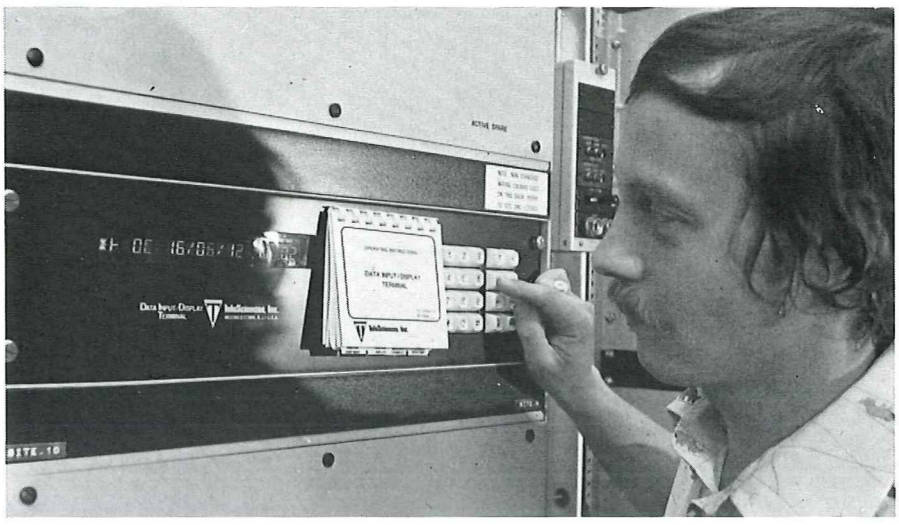
Meter readings are no longer needed with itemised bills. The bill still shows rental as well as a single line entry showing a total charge for all calls, dialled or made through an operator. Statements, identical in size to the bill, are attached giving details of each trunk and international call – date, starting time of call, the number dialled, duration and price, all in chronological order.

Operator-controlled calls are also included, but without the start time or duration of the call since this is not recorded by the operator. Local calls are added together and their total value is shown with chargeable units and the number of calls recorded. A total value is also given for itemised calls.

Customers not wishing to receive full call details will only be sent bills showing total call charges. Coin box renters will be sent statements, but to preserve the caller's privacy, these will only show the exchange name or dialling code, and not the complete dialled number.

The Bristol experiment will not only provide valuable information about any operational problems a larger system might bring but will also gauge customer reaction. Close monitoring will ensure that by the time itemised billing is extended, lessons learned from Bristol can be used to full advantage.

Each morning, Chris Nunn, the officer in charge of Bristol Redcliffe exchange, checks out the monitoring equipment. A single rack of equipment carries five interface units and a spare, with each unit handling 200 lines.



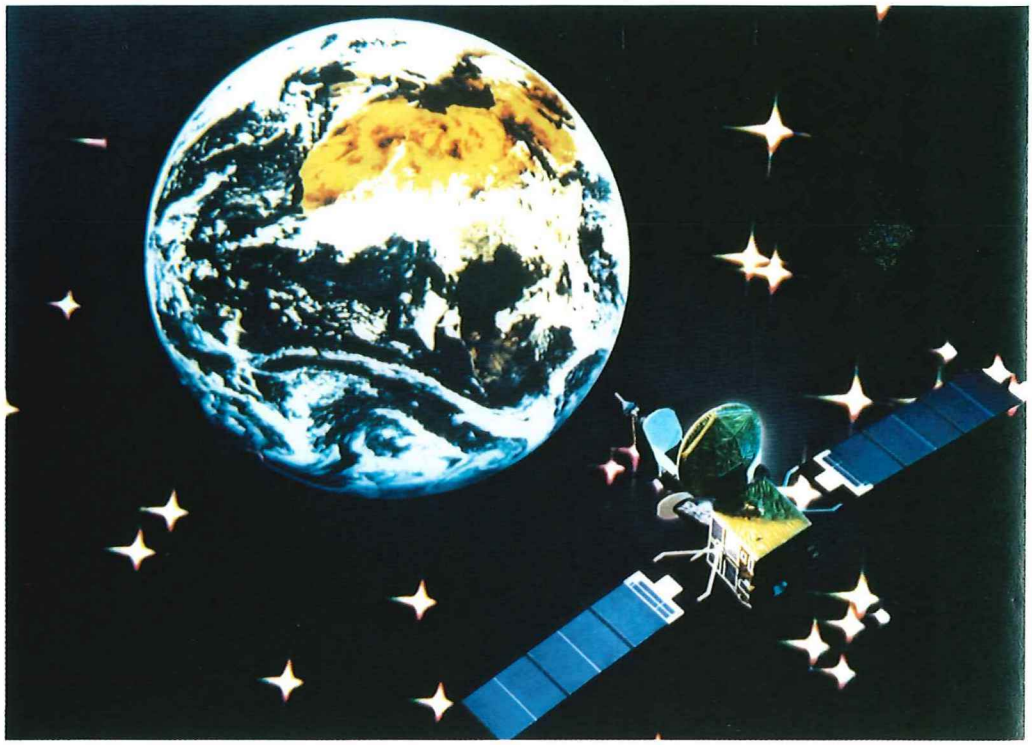
Mrs S. Knight is the project co-ordinator for itemisation on non-System X exchanges in Finance Department at BTHQ.

Mr L. Pikett has been responsible for setting up and implementing the subscriber billing complex in Bristol.

British Telecom Journal, Summer 1983

In touch with the world

The second article in our review of British Telecom's four main divisions looks at the key role played by British Telecom International (BTI) in planning, developing and maintaining the wide range of telecommunications services between the United Kingdom and the rest of the world.



Already, two Intelsat V satellites orbit the Earth above the Atlantic coping with the massive demand for telecommunication services on transatlantic routes.

With a turnover of more than £1,130 million a year and a net profit of nearly £200 million, BTI is big business. It is a pioneer in satellite, cable and radio communications and its services have helped make Britain the European communications hub for many multi-national companies. BTI carries television pictures and sound broadcasts to and from all corners of the globe, and provides comprehensive ship-to-shore communications for all types of sea-going vessels.

Following recent reorganisations, BTI is now grouped into seven separate units – five commercial executives, International Telephones, International Business Services, Operator Services, Maritime Radio Services and Telconsult, supported by International Lines and Satellite Systems executives. Each unit is headed by a chief executive reporting to the managing director, and is responsible for its own financial contribution as a profit or cost centre.

There are three chief officers – the chief operating officer, chief engineer and chief finance officer, plus a deputy chief engineer. Their role is mainly concerned with strategy, with co-ordination of the business, and with managing the central services activities of BTI as a whole.

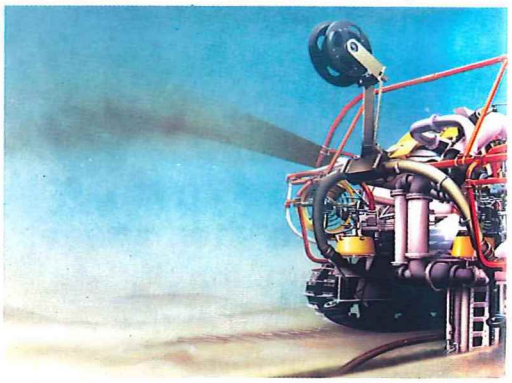
BTI's reputation for efficiency and innovation stands high among telecommunications organisations around the world, and the reorganisation will enable it to manage its activities more effectively and to react even more flexibly to market demands. Its basic aim remains to establish in the UK a centre of excellence in overseas communication by providing both business and residential customers with a rapidly widening range of higher quality services as well as exploiting technological opportunities at the most competitive cost.

British Telecom has always played a leading role in global telecommunications development and is one of the largest shareholders in the world's satellite organisations. Earth stations at Goonhilly Downs in Cornwall and Madley, Herefordshire, link Britain by satellite with more than 80 countries, and both stations transmit and receive a variety of signals, ranging from telephone calls to television pictures.

Continued growth of telephone traffic and live television coverage of sporting events like the World Cup, as well as state occasions, has made a third major earth station essential, and planning permission is currently being sought for alternative sites in Somerset and Dorset. To cope with the growing demand, this new earth station needs to be operational by the mid-1980s.

British Telecom set the pace for satellite communications in the 1960s, and today, worldwide, there are some 450 earth stations with more than 500 aerials in a system run by the 109-nation International Telecommunications Satellite Organisation (Intelsat), which also maintains the 16 telecommunications satellites in geostationary orbit above the

These dishes at Mormond Hill in Scotland communicate over the horizon with oil and gas production platforms.



***Top: CS Iris,* one of British Telecom International's three cableships, recently saw service in the Falklands' conflict.**

equator. British Telecom is the second largest shareholder in this system.

Another satellite system is soon to enter service under the management of the European Telecommunications Satellite Organisation (Eutelsat). This is the European communications satellite system which will provide links between European telecommunications networks, small-dish services for businesses and a network for members of the European Broadcasting Union.

BTI's small-dish satellite service for business use – SatStream – will next year offer private digital satellite communication facilities to Western Europe and North America. It will offer business customers sole use of an earth terminal – a small-dish and control equipment – sited on their own premises, or the use of a shared terminal nearby. Customers will be able to transmit and receive the full range of business-related information – computer data, facsimile and teleprinter, audio and videoconferencing, as well as ordinary telephone communications.

A further earth station will be opening shortly in the London Docks area to work with small or medium dishes to the European and Intelsat systems for specialist services such as television programme distribution and some SatStream-type applications.

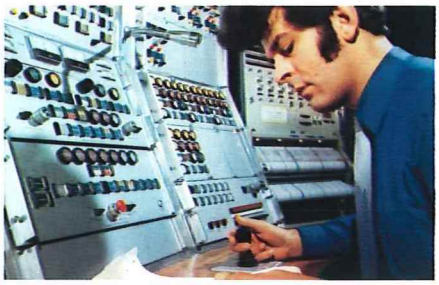
Equally important are the submarine cables in which British Telecom has joint ownership, or an investment in, around the world. The UK is linked to the European mainland by 24 submarine cables, and there are currently three cables crossing the Atlantic Ocean linking Britain with North America. BTI is also a co-owner in more distant submarine cable systems such as Atlantis, which links South America with West Africa and Europe, and Anzcan (Australia – New Zealand – Canada), which is due to be brought into service late next year.

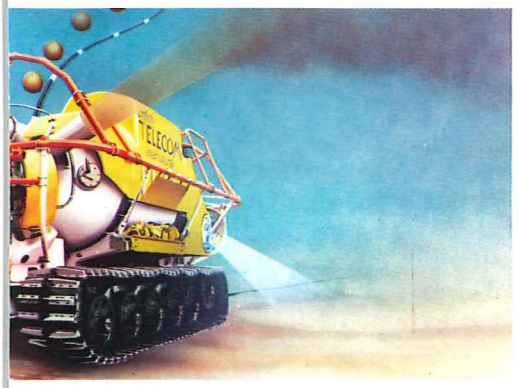
This summer, a new transatlantic cable – TAT -7 – comes into operation. Running between the UK and the USA, it provides 4,200 circuits, an increase of more than 200 per cent in capacity compared with Cantat 2, a similar cable brought into service in 1974.

And submarine cable technology continues to advance. By the end of the decade the first transatlantic cable to use fibre-optics technology will be in service. Optical fibre cables use hair-thin strands of glass as the transmission medium, and can carry 2,000 telephone calls simultaneously.

The responsibility for the laying, maintenance and repair of submarine cable systems falls to BTI's Marine Services. Based at Southampton, Marine Services operate a fleet of three cableships – *CS Alert, CS Monarch* and *CS Iris.* Southampton is also the major storage depot for several hundred miles of submarine cable and repeaters held for maintenance purposes. There is another depot at Dalmuir, Glasgow.

The sister ships, *Monarch* and *Iris* are both primarily used for repair and





Above: This remotely-controlled submersible designed to locate and bury cable in the ocean bed, enters commercial service later this year.

Top left: More than 200 UK-registered ships are equipped with radomes, effectively small satellite earth stations beamed into the Inmarsat communications system.
Top right: From Goonhilly earth station console, engineers continually monitor calls to and from the rest of the world.
Above: TAT-7, the last analogue transatlantic submarine cable, added more than 4,000 new circuits between the UK and the US, when it was brought into service following its landing at Porthcurno, Cornwall. The new generation of cables will use optical fibre digital technology.

maintenance work around the British Isles and on the continental shelf, although both ships are capable of working in much deeper waters. *Alert*'s prime function is repairing cables in the North Atlantic. Because of the cableships' ability to work in rough sea and weather conditions, *CS Iris* was last year 'called up' as a support vessel for the task force in the Falklands' conflict.

To help with the vital work of cable protection and maintenance, an unmanned submersible, remotely-controlled craft has been developed. It can operate in depths of up to 900 ft, trenching, inspecting and aiding the repair of cable. Operations are controlled via an umbilical lifeline from *CS Monarch,* which has been modified to work with the craft.

Vital too, is the service BTI provides for shipping, both in British coastal waters and on the high seas. At present, BTI operates a network of 35 manned and remotely-controlled radio stations around the UK. All but two provide coverage of British waters up to 40 miles from the shore, and of these, 11 give continuous coverage of more distant waters up to 200 miles from the shore. Worldwide coverage of the oceans is provided at Portishead radio, the long-range radio station, recently the subject of extensive modernisation.

British Telecom has also played an important role in the formation of Inmarsat, the international organisation responsible for providing the facilities and control systems for maritime satellite communications. BTI's new satellite coast earth station at Goonhilly provides a link for shipping in the Atlantic with points throughout the world. Through reciprocal agreements with the respective telecommunications authorities, BTI shares' in offering a service to ships anywhere in the world via similar coast earth stations in Norway and Singapore. There are now 37 member countries of Inmarsat, and British Telecom is the largest shareholder in Western Europe.

Apart from conventional HF radio services, communications with North Sea oil and gas production platforms are also made by tropospheric scatter techniques. Plans are well advanced to offer a small-dish satellite service to serve the needs of the offshore oil and exploration industry. A recent demonstration between Aberdeen and Amoco's Montrose Alpha platform successfully demonstrated the viability of this service.

The speed and efficiency of BTI's service to customers is nowhere more apparent and successful than in international direct dialling (IDD). Since IDD was first introduced in 1963, the service has been expanded to all customers in Britain and to more than 130 countries – reaching some 93 per cent of the world's telephones. And in less than a year, BTI has reduced the cost to the customer of international calls by more than £110 million a year.

To meet the demands of IDD, there are currently more than 23,000 telephone

circuits between the UK and the rest of the world, and each day, more than 350,000 overseas phone calls are made from this country. While a substantial number of these are made during the working day by businesses, latest figures show that 30 per cent of IDD calls are made in the cheap rate.

BTI also provides a first class service for business users. About 40 per cent of Europe-USA telephone traffic originates or terminates in the UK, but some 60 per cent of leased circuits are located in the UK. BTI offers excellent value for money as an international telecommunications centre in terms of the range of its services, its prices and its attention to customer service. As a result, it is the preferred location within Europe as a telecommunications 'hub' for multinational businesses.

The Telconsult Executive embraces both Telconsult and Teletrade. Through Telconsult, access to British Telecom's accumulated technology and expertise is available to overseas administrations over the whole spectrum of telecommunications. The rapid advance of modern technology has meant that many countries find themselves faced with major expansion and modernisation schemes which are often outside their experience. Telconsult offers impartial advice and practical help, ranging from the organisation, planning and finance of a new service to day-to-day operation and maintenance in more specialised fields such as satellite communications or data networks. The international high regard for British Telecom-trained staff is reflected in the constant demand for them to work on loan in dozens of different countries, enabling the client's existing staff to be trained alongside those regarded as the experts.

Teletrade is the overseas marketing arm of British Telecom whose role is to sell to overseas customers – mainly telecommunications administrations and the larger telecommunications organisations – a wide range of telecommunications equipment used by British Telecom. This comprises both high technology new equipment and that which has been recovered from the UK telephone system as part of the modernisation of the network and has been refurbished to a high standard. Since Teletrade came into being, nearly two years ago, it has grown into a substantial factoring business with sales of more than £3 million. Its most recent success was the installation of a City Business System, the first outside Britain, for the National Bank of Abu Dhabi in the Middle East.

Continuing its efforts to improve the overall service to customers, BTI has recently launched its new Business Communications Service (BCS) which will tackle all aspects of specification, design, installation and support of complex international communications on a total system basis. The service, provided in co-operation with PA Computers and Telecommunications Ltd (Pactel) will offer a range of consultancy, design, implementation and facilities management services anywhere in the world, thus relieving customers of the need to negotiate separately with carriers and suppliers in each country concerned.

For the immediate future, BTI is to use bandwidth reduction techniques, developed at British Telecom's Research Laboratories, Martlesham, to provide a visual conference service, called videoconferencing, which will use both satellites and submarine cables. In its early commercial operation, the service will benefit business communities in Britain and North America by providing simultaneous transmission of visual and sound signals, thus enabling groups on the two continents to hold conferences and meetings at a price well below anything previously available. The expansion of the service to other countries is expected to follow.

Telemessage – British Telecom's high-speed message service – has now been extended to the USA. BTI and Western Union International have linked Telemessage with Mailgram in the USA to provide a transatlantic service which is cheaper than telegrams and faster than airmail, offering next working day delivery to all addresses in the USA.

Bureaufax, BTI's recently established international service enabling customers without the necessary equipment to send and receive documents by high-speed facsmile, is currently available to 61 countries where delivery is normally by facsimile, post or personal collection.

Telex, sometimes seen as the 'workhorse' of international business, has been expanded and improved to the point where it is now possible to contact nearly 200 countries around the world. One hundred and eighty of these are accessible via the international Telex direct dialling (IXDD) network, and more than 99 per cent of all telex messages originating in the UK are directly dialled. Also, the service further offers satellite and radio links to ships at sea.

Last year, BTI introduced Telex Plus, a computer-controlled service that offers advanced facilities such as store-and-forward, multi-addressing and pre-registered address (PRA) lists. The service has only so far been available to London customers, but is to be extended nationwide this summer.

BTI also provides two data communications services, International Datel and the International Packet Switching Service (IPSS). International Datel, for transmission over the public switched telephone network, has been in operation since 1965. International Packet Switching, introduced in 1978, was the first public intercontinental data service to use the advanced and flexible technology of packet switching – a cost-effective way of sending and receiving information to and from distant locations.

Originally designed to provide access for UK customers to databases in the USA, IPSS now provides a wide range of facilities serving the needs of business organisations in Britain and the other countries who wish to transmit computer and other data. IPSS is available to and from 18 overseas destinations encompassing Europe, North America and the Far East. In addition an incoming-only service is available from a further seven countries.

Thus BTI, with its increasing range of services, greater efficiency and realistic tariffs, is fully confident of continued success in the new competitive environment in which it is operating.

British Telecom Journal, Summer 1983

Frank Lawson

The year 1983 is significant for international telecommunications. Not only is it world communications year but it is also the third anniversary of the announcement by Sir Keith Joseph marking the start of liberalisation in UK telecommunications.

Throughout the world, telecommunications are being revolutionised by the phenomenal scale and speed of technological development in the converging worlds of computers, communications and consumer electronics. In particular, there is an exceptional amount of world interest in the outcome of the British experiment.

The technological advances in the UK are further influenced by far-reaching changes in the physical structure of the industry itself brought about by the Conservative Government's strategy of separation, liberalisation and privatisation. The second Telecommunications Bill in just two years, until recently before Parliament was intended to sweep away the traditions of 100 years. One other network – Mercury – has already been licensed to compete with British Telecom – ending a long period as sole network provider.

Mercury in fact, is already flexing its muscles and bidding for customers. On the horizon is the prospect of two competing cellular radio systems which may completely transform future telecommunications. With one of the widest value added network service licences in the world, cable television, and the prospect of information technology in the home, there would seem to be few sacred images left – and those that are may well be influenced by the outcome of the recently published Littlechild report.

Some commentators have been surprised to see how quickly British Telecom has adapted to the new situation. Major reorganisations at headquarters and in areas have been designed to create profit centres and units which can concentrate on particular market sectors and challenges. Product ranges have been modernised and extended with a heavy emphasis on electronic technology. Changes in the network have been accelerated, new facilities offered to customers and joint ventures of various kinds have produced innovation. New management philosophies and restructured sales forces are already benefiting customers.

In his statement three years ago, Sir Keith Joseph highlighted the need to open up the supply, installation and maintenance of customer equipment. One common fallacy is that it is only since the 1981 Act, that private industry can supply equipment for connection to

British Telecom has been helping to promote competition and customer choice since 1980. The catalogue of initiatives is a long one and includes:

★ Approval of private auto-diallers used with modems and data network management systems.

★ Further liberalisation of mobile radio and radiopaging systems.

★ Supplying certain Special Range telephones for private sale.

★ Liberalisation of discrete modems.

★ Interim standards for privately-supplied extension telephones – nine already evaluated.

★ New conditions for interfacing autodialling telemetry systems.

★ Interim standards for private callmakers and integral modems – already 22 such devices have been evaluated and British Telecom has helped BSI to evaluate 16 more.

★ British Telecom's 700-series telephones as well as all other Special Range telephones were freed for competitive supply as exchange line extension telephones – but not as PBX extensions.

★ Four telex teleprinters already approved.

★ An agreement with the Office of Fair Trading that direct dialling facilities would be offered to private sector operators for radiopaging purposes.

★ Interim standards for cordless telephones and an evaluation – undertaken with the Home Office – of British Telecom's own product and up to four other private cordless phones selected by the Department of Industry. British Telecom has agreed to the competitive supply of its own product.

★ Co-operation with interim standards for small call routing systems. British Telecom is finding resources to evaluate a small number of DoI selected systems before formal liberalisation.

A laboratory used by British Telecom to evaluate manufacturers' equipment before its possible connection to the network.

British Telecom networks. This is patently untrue.

During the past 20 years for example British Telecom has approved more than 10,000 types of privately-supplied attachment to its networks, including alarms, answering machines, data terminal equipment, modems, facsimile machines and large, sophisticated PABXs. The aim of the Government's liberalisation measures is to extend this policy to the many telephones, callmakers, modems and small and medium call routing systems previously supplied only by British Telecom.

The first problem which faced the government was the lack of objective standards against which all equipment could be tested. The Government asked the British Standards Institution (BSI) to make a start, and working within its traditional framework with representatives from 24 trade and user associations, they have faced an uphill task. Currently, there are seven committees, with British Telecom represented on each one. Items covered are:

★ TCL 1 Safety
★ TCL 2 Public switched telephone network sub-committee – telephones
Public switched telephone network sub-committee – PABXs
★ TCL 3 Telex
★ TCL 4 Packet switched services
★ TCL 5 Private circuits
★ TCL 6 Digital data services
★ TCL 7 Cabling and installation standards (PBXs)

Under the monopoly, British Telecom had approved attachments to the network and its integral equipment. The Government asked the British Electrotechnical Approvals Board (BEAB) to approve apparatus to the new standards. Because telecommunications was to them a new field, British Telecom was able to help. When BEAB's subsidiary, the British Approvals Board for Telecommunications (BABT), was founded to approve telecommunications apparatus, British Telecom, together with certain trade associations and the Government provided them with a loan. Eventually, BABT will have overall responsibility for approving all telecommunications equipment.

Now as always, testing has been necessary to ensure customers can call each other, and enjoy satisfactory end-to-end transmission in safety without causing damage to British Telecom equipment or staff or deterioration in the service to others. Testing will continue to protect both the general public as well as the reputations of the telecommunications industry and network operator.

BABT has faced many difficulties but has now established itself and has received the first approval applications. British Telecom has given advice and, as an agent of BABT, continues to play a significant role, although in time it will play a smaller part and will no longer be in the awkward position of being judge and jury over potential competitors.

PABXs have become a key area for improved customer choice. Both the Department of Industry (DoI) and British Telecom have encouraged the growth of popular systems with technology capable of providing integrated voice and data communications. The Government has planned for a phased liberalisation of supplying customers' equipment and part of the programme to meet this change, British Telecom is evaluating, under licence from the Secretary of State, PABXs from six companies to meet current and short-term future demands.

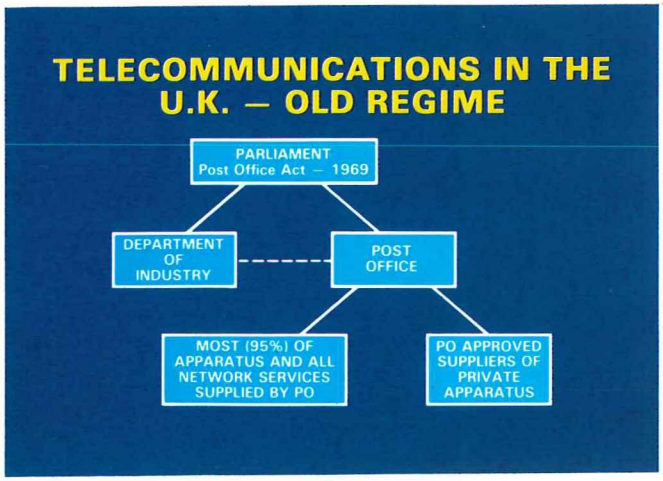
British Telecom has also helped formulate a BSI scheme for standards and approval procedures for maintenance contractors, and will, of course, compete in this area when the market is deregulated. Apart from regulatory activities, British Telecom is rapidly extending the range of products it is offering to customers.

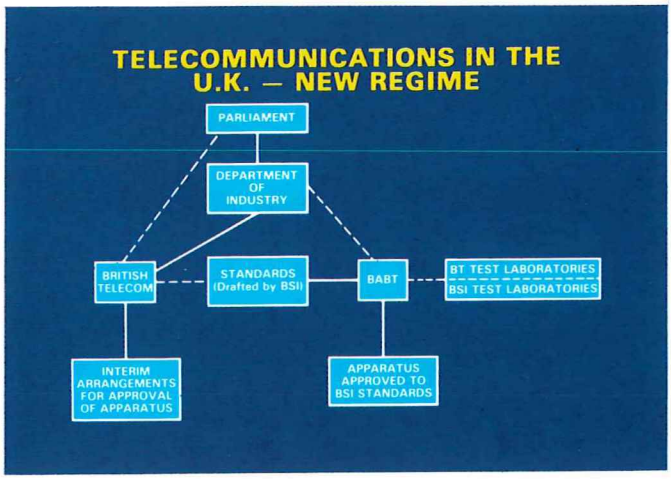
At the time liberalisation was first announced, emphasis was on competitive supply of equipment but perhaps the most significant developments have been in the network. Mercury was licensed following a report by Professor Beesley and it would be a mistake to underrate the nature of the competitive threat from a network of this kind. The US experience shows that similar networks are, after a slow start, now rapidly expanding.

For many months after Mercury was licensed, British Telecom, with the DoI and representatives from the telecommunications and computing industries, were engaged in tough talks to arrive at a definition of value added network services, an issue which has caused problems in the US and throughout the world. In essence, the general licence, one of the most liberal ever drafted, allows any system to be run over the British Telecom, Mercury or Hull public switched or private circuit networks which adds genuine value in the form of storage, processing or conference calling. Aim of this measure is to allow innovation in information technology – leading to more traffic for the carriers.

In ten or 15 years, the introduction of competing cellular radio networks may well be seen as one of the most significant developments in the liberalisation programme. Mobile radio systems have in the past appealed necessarily to a small and select clientele. Once it seemed that citizen's band radio might meet the needs of a much larger market sector but cellular radio, due to start in 1985, could transform the image and importance of the service.

Not only might early growth be spectacular but a new range of customer equipment and add-on facilities will be provided, and the gap between people on the move and those at home or in the office narrowed. Radiopaging services will be improved and expanded as will cordless telephones.





Deregulation will also affect network use in the home. Prestel and viewdata services began this change and home computers have already stimulated it. Network developments allowing gateway facilities have helped, as have current energy-saving policies. But one of the most exciting developments is the prospect of interactive services on cable television. Here the potential for both customer and network operator has clearly been seen in the fascinating information technology house in Milton Keynes where the corporation has clearly seen that telecommunications is about people and progress.

With the Government proceeding with a Telecommunications Bill based on that which fell as a result of the general election, the future of telecommunications in this country will be strongly influenced by the proposed Oftel (Office of Telecommunications) regime; and, for British Telecom in particular, by the terms of its licence. These would probably include both obligations on British Telecom to provide a 'universal' telecommunications service in the UK, and conditions designed to ensure a fair balance between British Telecom and its competitors. But the regime also must be sufficiently visionary to enable the organisation to develop, and exploit full-bloodedly for its customers, the new services becoming possible.

Where it will all end depends to a large extent on British Telecom. The future for those fortunate enough to be engaged in marketing will not be fun but it will be challenging – and in an expanded market both British Telecom and its competitors will have considerable scope.

An example of a rapidly improving and expanding service is Radiopaging.

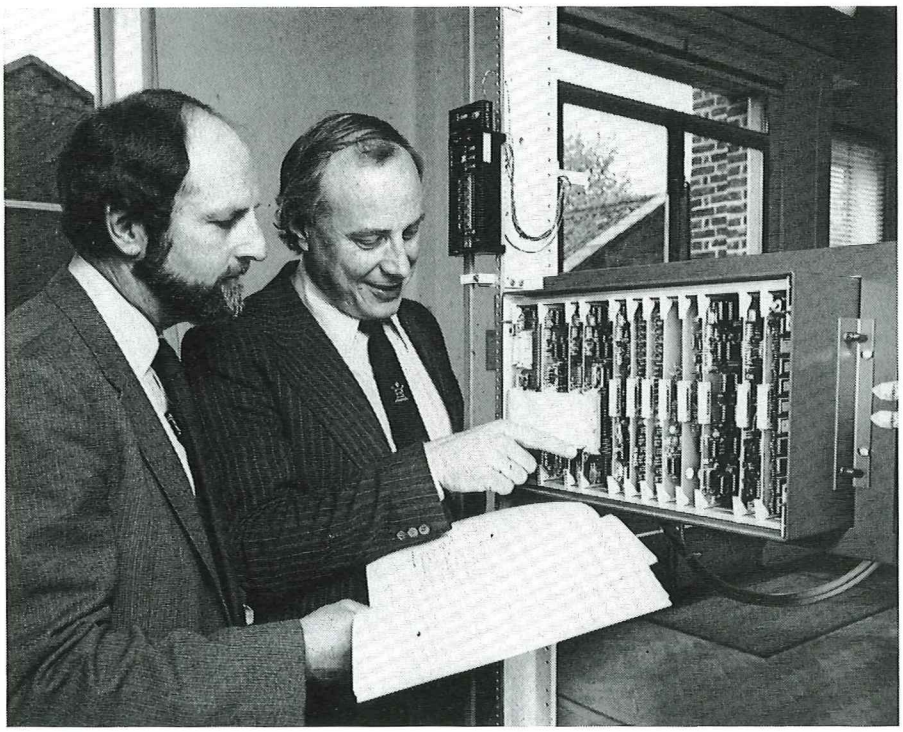
Hawk is the trade name for the cordless phone being sold by British Telecom.

Mr F. Lawson is Director of Regulatory Affairs at BTHQ.

British Telecom Journal, Summer 1983.

Testing time for faults

Jim Hutchings and Dave Dewfall



The authors, Jim Hutchings (right) and Dave Dewfall, check the setting of an address switch on the Colt dialler card.

Despite complex switching equipment and sophisticated transmission systems, telephone service to customers depends as much on the simple pair of wires between the exchange and telephone as on any other factor. Regular routining of the local underground cable network can detect defects before they cause service interruptions and so a new approach to testing customers' lines has been pioneered in Bristol Telephone Area where a new subscriber line testing system has been introduced. Known as 4TEL, it is manufactured by the Automatic Test Equipment Company, Teradyne.

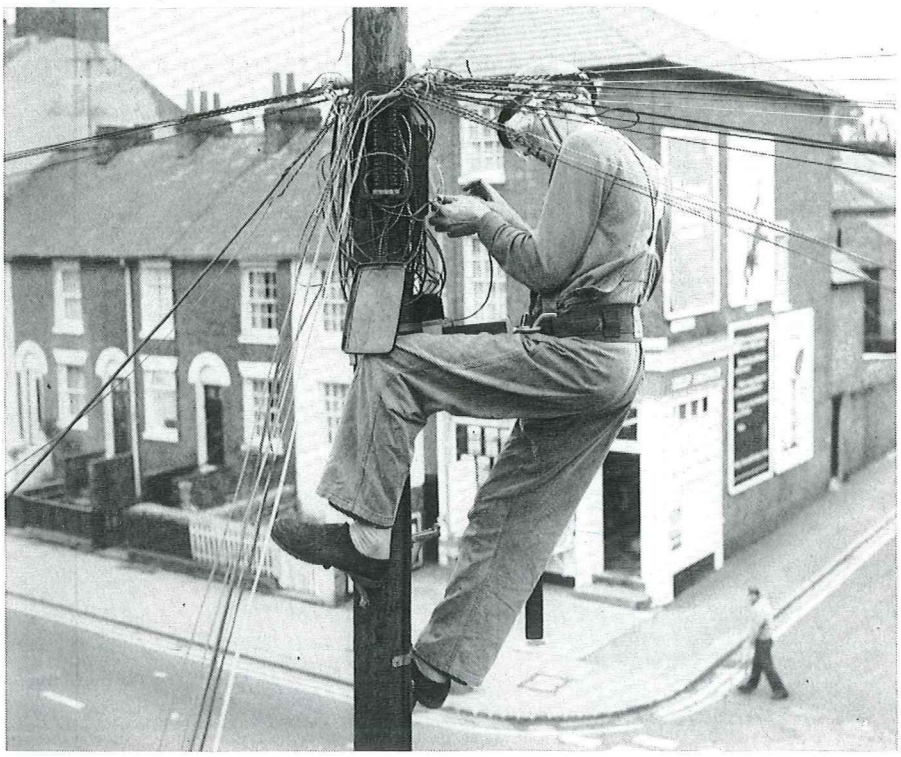
Bristol was the first area in the country to install this system – initially on a field trial basis. Local management wanted to harness the power of microelectronic technology to help achieve greater efficiency in the repair service and give a better service to customers. The idea was to see whether 4TEL could help detect and repair faults before the customer was even aware of them, reduce fault clearing times, distribute faults to the right person first time and generally derive better performance from external plant.

The trial system involves testing about 25,000 working circuits on four exchanges – two electronic at Avonmouth and Stoke Bishop and two crossbar, one at Almondsbury and the other at Henbury.

The heart of the system is the central office line tester (Colt) – a microprocessor-controlled measurement unit which is installed in each local exchange and gains access to each subscriber line via the exchange test selector. It can routinely test up to 10,000 lines overnight and performs a range of other tests on demand. Colts are linked back to a service area computer (SAC) over data links with no distance limitation. Although only four Colts are featured in the trial, the system can be expanded to handle many more than this.

Repair service staff operate the system by visual display units (VDUs) connected to the SAC. The SAC is interfaced to a British Telecom small business computer (SBC) which holds routing information. It is planned to

4TEL pinpoints the location of a fault, enabling a faultsman/jointer to clear the problem quickly.



interface 4TEL with the computer-assisted RSC system called ARSCC – administration of repair service controls by computers – (See *British Telecom Journal* Winter 1982/83) when this is installed in the near future.

The primary functions of the 4TEL system are network surveillance, line testing, fault distribution and fault location. In the network surveillance mode, all lines served by 4TEL are tested every night and directory numbers of faulty lines and permanently busy lines are automatically printed out early each morning at the RSC.

Faults are given a distribution priority of severe or moderate and categorised into battery contacts, shorts, earths and background. Abnormal voltages on lines are also reported. Fault information can be fed to the SBC which groups the lines by cabinet, pillar and distribution pole to give early warning of potential black spots.

If a nightly routine reports a customer's line as faulty with a battery contact fault, the fault is handed, early in the morning, to the duty repair service control officer (RSCO). He tests the line using 4TEL and confirms the fault still exists. The screen (below) verifies that there is an earth fault which is registering 572 ohms towards the interaction point. If necessary the RSCO calls up the past eight day's surveillance history on the line together with an insulation summary which indicates any multiple faults.

There is also a dial speed and multi-frequency testing facility and special tests are available to help diagnose more difficult faults such as overhearing and mains-induced noise.

The Colt can measure cable pair imbalance and this can be displayed on the VDU. In the case described above, a fault exists and the RSCO is able to distribute it quickly to an underground faultsman.

A faultsman/jointer is given the report and, after checking cable information arrives at the appropriate distribution pole to perform an interactive test in co-operation with the RSC. The RSCO uses the 4TEL contact location sequence to take the faultsman/jointer through the procedure. A short is put on the faulty circuit so that the system can recognise the identified pair and the Colt can make a series of rapid measurements to find out where the faultsman/jointer should go to find the fault. Within a minute or so, 4TEL reports the distance from the faultsman/jointer to the fault in ohms and in distance. The faultsman/jointer makes good the repair and then asks the RSCO to retest the line to verify that it is working. In a case like this, the customer is back in service before he even knew he had a fault.

The Bristol 4TEL trial has been monitored by a joint committee comprising local management and unions. Night surveillance, linked to black spot analysis, is helping the area to establish a more preventive and less reactive maintenance approach. Bristol Area now plans to expand the 4TEL system to 20 Colts serving virtually the whole of Bristol north and central RSC territories and taking the capacity up to 116,000 working circuits.

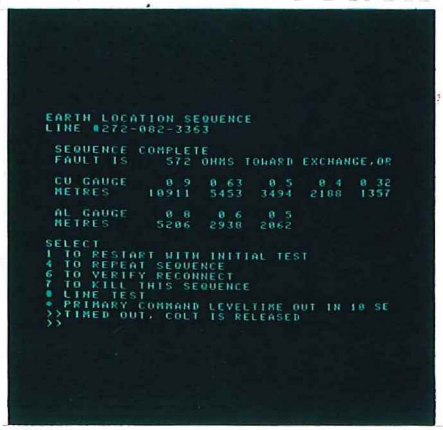
Mr J. L. M. Hutchings is executive engineer, local cable maintenance and **Mr D. W. Dewfall** is assistant executive engineer, 4TEL project officer, both of Bristol Telephone Area.

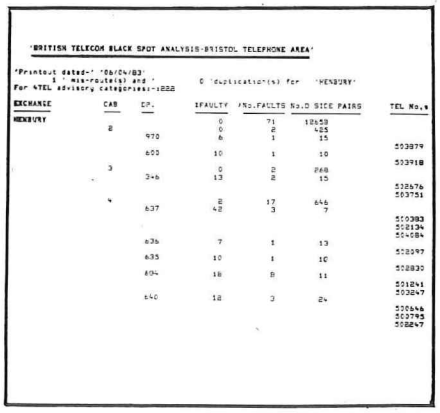
British Telecom Journal, Summer 1983

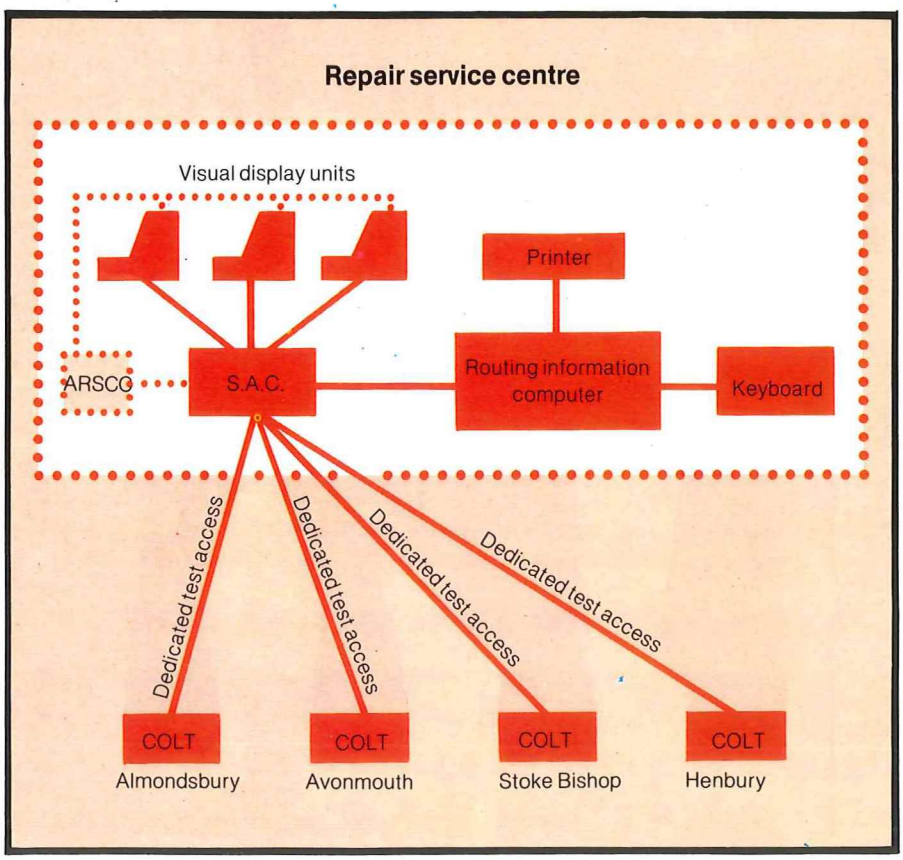
Below: Every night, all lines served by the 4TEL system are tested, and directory numbers of faulty lines and those that are permanently busy are automatically printed out first thing each morning.

Bottom left: An earth fault sequence as displayed on the screen.

Bottom right: Layout of Bristol 4TEL trial system.

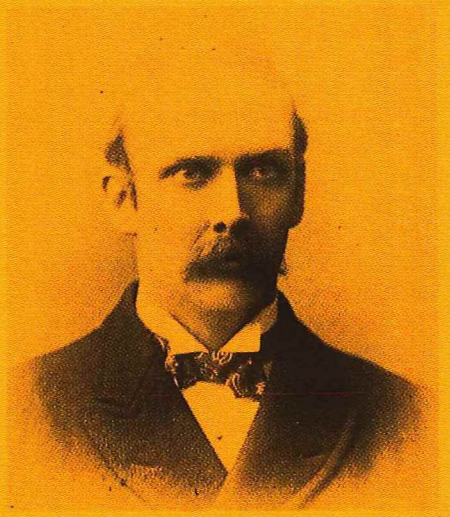






A Leonard Stokes design, Gerrard exchange building was constructed on the site of the Pelican Club in London's Soho and opened in 1907.

The forgotten architect...



Leonard Aloysius Stokes.

Continuing our short series by Reading Area telecommunications historian, **John Duncan,** this article looks at the career of little-known telephone exchange architect, Leonard Aloysius Stokes.

Today, more than 50 years after his death, Leonard Stokes is hailed as an architectural genius. Of 19 telephone exchange buildings he designed before 1914, seven are still in working order and continue to play an important role in British Telecom's network.

Stokes' ventures into the world of telephone exchange design roughly coincided with his marriage in 1898 to Edith Gaine, daughter of William Gaine, managing director of the National Telephone Company, whose multi-million pound assets are now part of British Telecom. Until then Stokes, who was 40, had confined his talents mainly to church design and was ranked in the top six architects in the country.

Beginning with a cautious approach, Stokes' first works were poor imitations of late Victorian, 'Gothic' architecture. But after his marriage he quickly established himself as a pioneer in stylistic modern buildings which were immensely strong. A carcass of iron beams, riveted together, formed a framework of metal. This in turn was jacketed in a shroud of reinforced concrete. The whole was then covered with a cosmetic façade of hand-made bricks and columns of Portland or York stone. His windows, however, are his thumbprint of recognition. Almost all his buildings have large arch-shaped windows at ground level.

By the time his father-in-law died in 1907, Stokes was already being greeted as the innovator of a new national style for British architecture. His telephone buildings at Reading (Minster Street), Cambridge (Alexander Street), Aberdeen (Bon Accord Street) and at Southampton, Tottenham and Blackheath, were classic examples of his work. His crowning achievement was in 1910, when he was voted president of the elite Royal Institute of British Architects – a post that he was to hold on to for two years.

But 1912 was a bleak year for Stokes. His monopoly of the British telephone buildings programme was broken. The licence, granted by the Postmaster-General in 1880 to the National Telephone Company, to develop the telephone network, was ended. All the company's assets, including the exchanges, were taken over by the Post Office. Stokes was made redundant. Undaunted, he returned to his original craft of designing churches. His last major contract of any significance came in 1915, when he designed the impressive Cathedral in Georgetown, Guyana. By this time, the Great War in Europe was in full swing. Men and materials were in short supply, and building construction ground to a halt. Stokes was never to work again.

But he was not altogether forgotten, for in 1919 he was honoured with the Royal Gold Medal. A grand ceremony was held in London, with a display of his drawings and pictures. By 1925 he was completely paralysed, and he died at home, in Chelsea, on Christmas Day. T

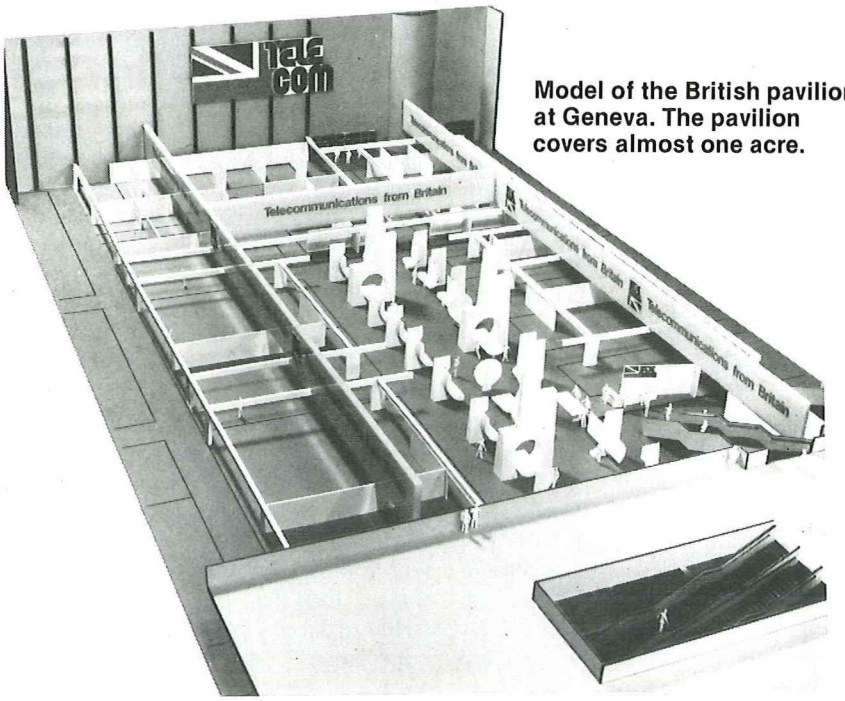
British Telecom Journal, Summer 1983

British Telecom is again demonstrating a clear intention to maintain its leading role in world telecommunications markets with its impressive list of services and systems on show at the World Telecommunications Exhibition – Telecom 83 – in Geneva at the end of October.

Geneva showcase

British Telecom runs one of the world's largest and most sophisticated telephone networks. It is introducing the world's most comprehensive optical fibre and digital transmission links and is marketing and maintaining advanced business and residential communications equipment. It is now also providing UK trade and industry with more and more integrated telecommunications facilities and is establishing London as the hub of all international communications networks.

Its stand at Geneva has three main areas and themes – London as the centre of communications, office automation by British Telecom, and British Telecom's expertise in planning, managing and operating networks. In addition there will be specialist areas featuring sub-



Model of the British pavilion at Geneva. The pavilion covers almost one acre.

The British Pavilion at Telecom 83, covers an area of nearly one acre, and the latest telecommunications techniques and products from the UK will be on display.

Focal point will be the co-ordinated area in which British Telecom, GEC, Plessey, STC, Marconi and TMC jointly participate to show a comprehensive capability to serve the needs of posts and telecommunications authorities and other communications organisations throughout the world.

Among new exhibits to be seen in this joint area is an extensive range of new-generation systems and equipment, covering every aspect of switching, transmission, rural communications and advanced services, all brought together by an integrated services digital network (ISDN).

As well as SystemX, the UK's new national exchange for the digital era, Britain is featuring the UXD5 system especially suitable for providing small stand-alone exchanges in rural areas of low telephone density.

Surrounding the co-ordinated display are the individual stands of the six joint participants. Also in the British Pavilion, are 58 other exhibitors under the aegis of the Electronic Engineering Association and the British Overseas Trade Board (BOTB). There is a special external display area, of some 2000 square metres, where equipment including mobile earth stations will be operating.

Some of the modern telephones on show at Geneva.

Submarine cable systems form a specialist area of the stand.

Slow-scan television is being demonstrated . . .

marine systems and high technology spotlighting the latest research and development, with optical systems as the focal point. The combined activities of Telconsult and Teletrade are also being featured, along with an explanation of the new competitive stance British Telecom is now adopting.

The huge stand also reflects the organisation's new, streamlined profile. A particular feature is how British Telecom is turning the UK – focused on London – into a centre for world communications. It shows how its digital telecommunications network is growing and how British Telecom can provide the world with the expertise and equipment needed to plan, manage and operate modern communications systems. Particular emphasis is placed on the ability to sell high technology products, services and technical know-how overseas through its exporting arms, Telconsult and Teletrade. The aim is to boost the market for British Telecom's own products, as well as improving export opportunities for the country's telecommunications industry as a whole.

Already, many of the world's largest trading companies regard the UK, with its excellent international links, as the world's telephone exchange. Japan's top ten companies have already chosen London as their communications hub. The stand will promote the marketing aims of British Telecom London and British Telecom International by using four illustrative themes, led by X-Stream services and Overlay, the high-speed digital network which overlays existing services. The display shows how the X-Stream family of advanced public and private network services were first introduced.

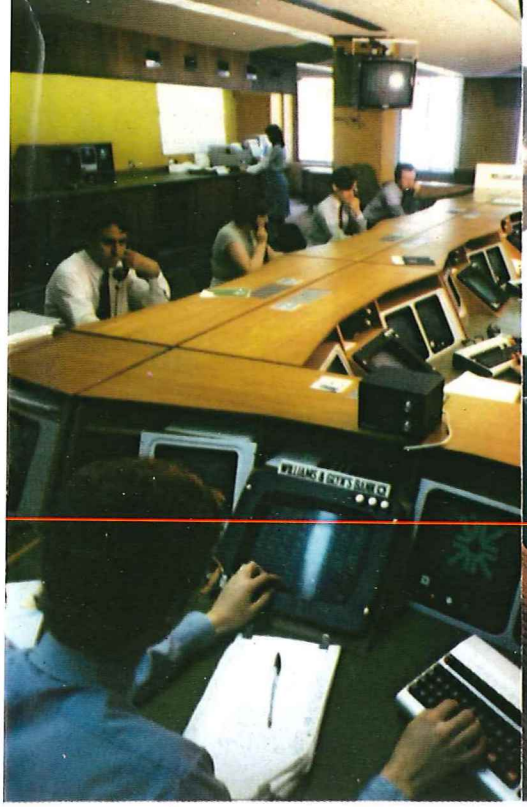
The X-Stream services are designed to provide high-quality digital services either on a switched basis – SwitchStream – or on a point-to-point basis – KiloStream and MegaStream. SatStream will offer switched point-to-point and point to multipoint facilities via satellite. One way of bringing the Overlay network into customers' premises will be via 29 GHz microwave radio, and one of the tools for interconnecting the 2 Mbit/s streams of data to and from customers, will be the 2 Mbit/s digital switch. British Telecom will demonstrate it by using an electronic funds transfer terminal operating over packet switchstream (PSS) and the International Packet Switching Service (IPSS).

PSS extends the choice to customers for data transmission. It is accepted as the main network solution where widespread standardisation and error-free communication is required using an internationally accepted protocol. The flexibility and availability of PSS make it useful for most data applications. Access between the UK and overseas customers is provided by expanding IPSS which covers more than 20 countries. This service also provides major international transit facilities for packet-switching traffic between other countries.

Specialised packet assembly/disassembly units to support electronic funds transfer and gateways to other networks are being introduced. Initially the PSS-to-telex adaptor will be used to support teletex operation. A PSS-to-Prestel gateway is also on display, as it forms the basis for home banking and shopping facilities. Another important development for PSS users is British Telecom's network interface unit (NIU). This is a powerful but cheap packet concentrator and switch, handling up to 32 terminals and four PSS connections.

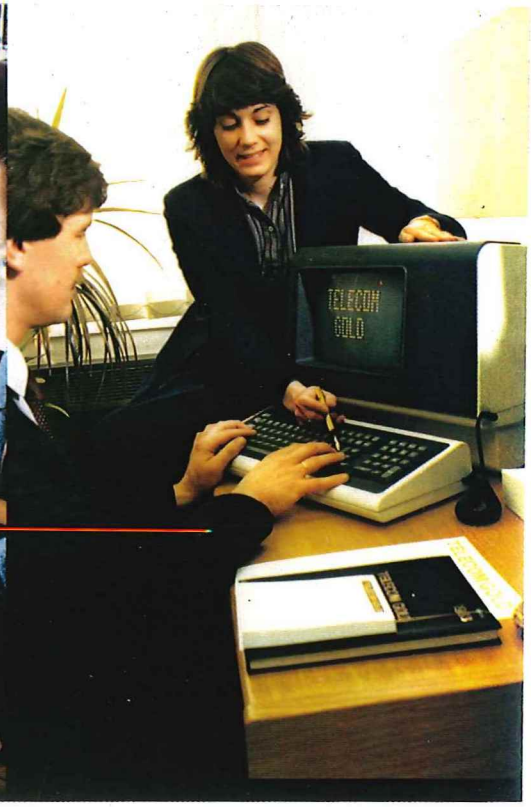
Kilostream is British Telecom's major digital private circuit service, offering business customers a digital link within 30 days. Ideal for large companies or multinationals with heavy data transfer needs, the KiloStream service will grow from 250 exchange sites this year to 400 by the end of 1984. MegaStream is the highest digital rate private circuit service in the X-Stream range. Although it can be tailored to speeds up to 140 Mbit/s, British Telecom expects the main interest at Geneva to come from companies wishing to upgrade their analogue wideband circuits to 30 or 31, 64 kbit/s digital channels.

The other private circuit service of the X-Stream range is SatStream (see page 28). This small-dish satellite service will offer integrated and flexible digital transmission facilities for intra-company networks from early next year. Earth terminals will offer businesses private digital integrated communications across Western Europe, to North America or within the UK from anywhere in the British Isles. Access to the satellite will be



. . . and the City Business System is also on show.

Prestel's Micronet 800 service is likely to be a major attraction . . .



. . . while Telecom Gold electronic mailboxes are being shown in action.

via these small dish earth terminals, either at a customer's premises or at a nearby location for simultaneous use by several customers. Transportable terminals will also be available for providing urgent or temporary links.

The stand contains exhibits showing how British Telecom is coping with the rapidly changing field of information transfer and the evolution of new-range teleprinters, Telecom Gold electronic mailboxes, Bureaufax and the development of a comprehensive teletex service. Here the emphasis is on service to the customer and the international nature of the services available, such as international leased telegraph message switching (ILTMS) and international private leased circuits (IPLC).

Slow-scan TV, Teletrade's new City Business System and other advanced developments in Prestel are all being shown in action. Where possible, hardware will come from the British Telecom Enterprises (BTE) Merlin range. Many customer products are also on show including modern telephones and other advanced equipment, which not only illustrates what British Telecom can provide on existing networks, but gives a modern profile to Teletrade's marketing image by showing the modern equipment that can be bought through Teletrade. A new videoconferencing system, using 2 Mbit/s digital links, and eliminating the need for a fully equipped Confravision studio will also be on display. This will increase flexibility and reduce costs to a level where businesses can have individual private systems.

Office automation systems by BTE are being strongly featured. One development – marketed through Merlin – is a modular system of terminals and interface units allowing customers to automate their offices and add further services as the need arises. Although London is being used as the backdrop for these Merlin products, it is being made clear that they are available throughout the UK. By October, products will include a high quality word processor and a range of small business computers all with telex and data communications facilities.

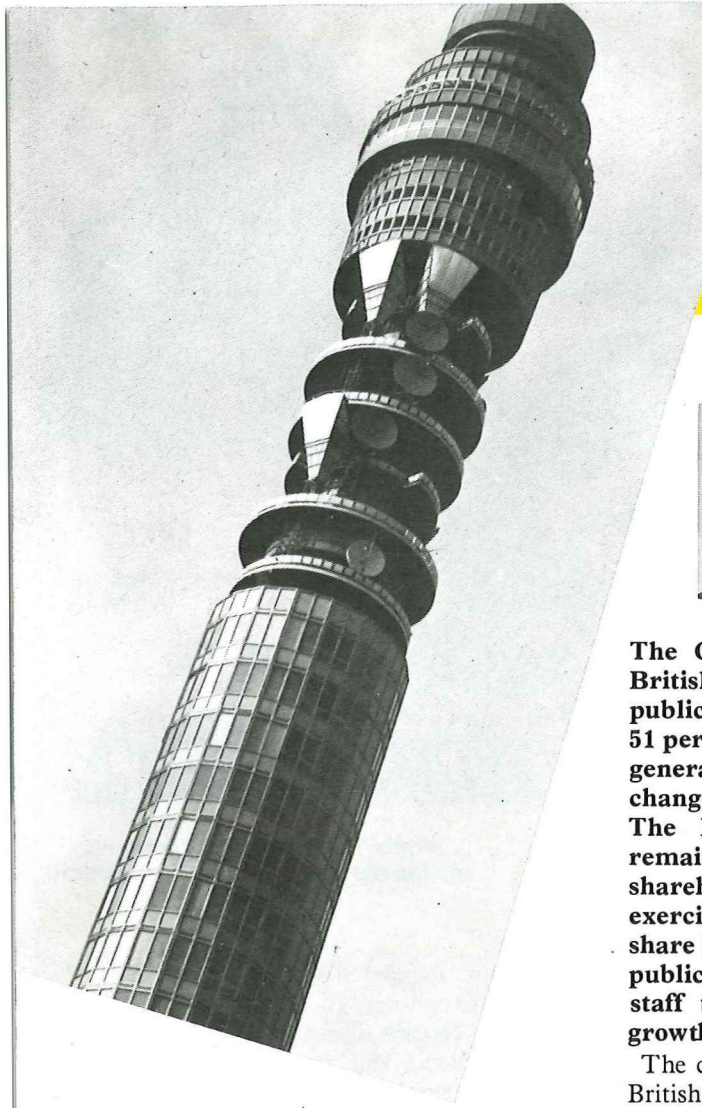
The theme on the planning, management, operation and promotion of networks shows how British Telecom – through Telconsult – helps overseas communications administrations. This part of the stand deals with the issues involved in planning a network, with emphasis on conversion from analogue to digital. Examples include traffic measurement using portable traffic recording equipment, cable performance measurements with a digital crosstalk analyser, planning rules for digital lines, and aids for junction network design.

Managing and operating a network is a daunting task, but one which Telconsult can handle by offering the skills of British Telecom staff. That British Telecom can advise and deal with such problems is being shown by demonstrations of the building services management system, the repair service centre (RSC) organisation, and the building distribution system with 'Rapide' plug and socket connection to customer equipment.

Submarine systems form the specialist area of the stand, and deal with such issues as development, planning, installation, commissioning and maintenance. The display features cable joint designs and cable fault location equipment, as well as the development of lightweight cable using optical fibre and cable testing machinery. New fibre cable designs and jointing techniques are also being shown.

British Telecom International can install and commission a complete submarine system from cable station to cable station. A special feature includes a demonstration model of its unmanned remotely-controlled underwater vehicle about the size of a five-ton truck – which can bury and survey submarine cables. With optical fibres as the focal point in the final part of the exhibition, British Telecom looks to the future, pointing out that the hardware on display is just part of the total research and development effort undertaken.

Thus British Telecom has two main aims. It wants the world to bring its communications business to the UK – particularly London – and it wants to encourage the world to buy British Telecom expertise through Telconsult, and British Telecom products through Teletrade. Geneva provides the ideal shop window . . .



SHARES IN

This article, specially written for *British Telecom Journal* by **Sir Nicholas Goodison,** chairman of the Stock Exchange, looks at what is involved when a state-owned corporation like British Telecom is sold off to private investors.

The Government's intention that British Telecom should become a public limited company, with up to 51 percent of shares available to the general public, marks a crucial change in British Telecom's life. The British Government would remain as the major single shareholder, but would cease to exercise commercial control. The share issue will also give the British public and British Telecom's own staff the chance to share in the growth of the organisation.

The creation of the new structure for British Telecom follows the launch of British Aerospace, Cable and Wireless, Amersham International, Britoil and Associated British Ports. But the sale of British Telecom shares will be a much larger operation than any of these.

All these former state-owned corporations were turned into public limited companies, with share capital which could be transferred between investors through the Stock Exchange. About 50 percent of this capital was then sold to the general public and to the company's employees.

But how was this done? Basically, the Government and the companies were advised by banks and firms of stockbrokers who dealt with all details and formalities. Then, when everything was in order and all the legal and accounting requirements dealt with, a prospectus giving all the necessary details of the company, its trading results and its financial position was published, along with a form inviting investors to apply for shares in the company.

Most of these issues were made by an 'Offer for Sale', where investors apply for shares at a fixed price agreed between the Government, the company, the banks and the stockbrokers dealing with the offer. The Britoil offer however was handled differently. The shares were sold by tender. Instead of an offer for sale at a fixed price, a *minimum* price was fixed and investors were invited to bid for shares at or above that minimum price.

Any method of flotation has its risks. For example, a fixed price could be chosen for a company which proves unexpectedly popular, meaning in hindsight that the price could have been fixed higher. And if for any reason a sale by tender is undersubscribed, then shares will be sold for no higher than the minimum price.

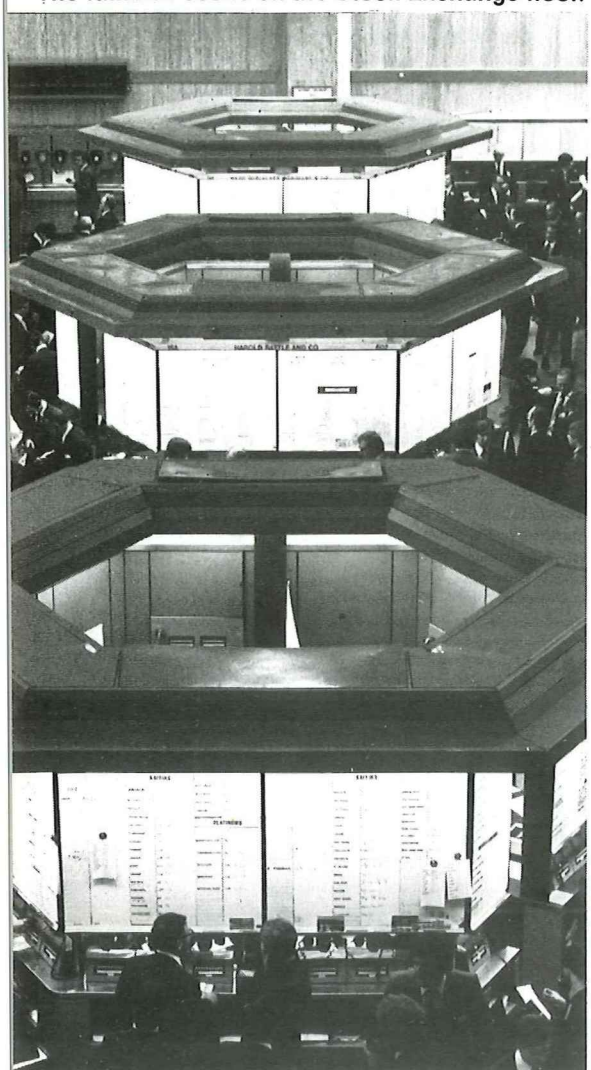
In the event, for example, too few investors applied for Britoil shares, because the oil market was changing rapidly at the time of the issue. But that did not mean the Government and the company did not raise the money they were expecting. The shares not taken up by investors were allotted to the underwriters who, for a small percentage fee, agree to take the risk of having to buy the shares at the issue price if not enough investors do so.

The staff of all the companies were allocated free shares as part of the issue and were given preference in subscribing for more. Apart from Britoil, which at the time of writing is priced in the market close to its issue price, all the shares mentioned are priced between 13 per cent and 150 per cent above their issue prices. But it is not just a question of quick profits. The employees have chosen to take a share in the future prosperity of the companies concerned.

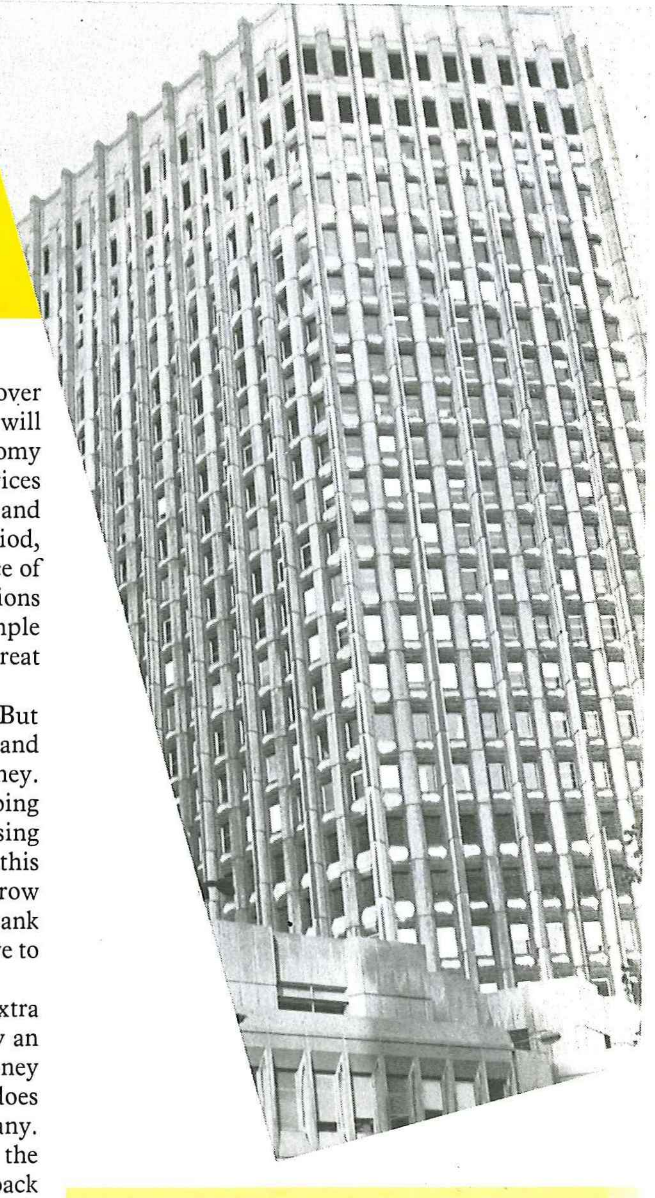
Of course, share prices can fall as well as rise according to the general state of confidence in the country or in response to the company's own achievements, failures and prospects. But British Telecom is in the forefront of information technology, and its prospects are highly encouraging.

But, to return to basics. What is a share and what is the Stock Exchange? Stocks and shares play an important part in most people's lives. Anyone who has a life assurance policy or is a member of a pension scheme, for instance, is involved, because the premiums paid are invested

The familiar scene on the Stock Exchange floor.



THE FUTURE



in stocks and shares through the Stock Exchange.

When a company is floated initially, as British Telecom will be, shares are not sold on the Stock Exchange floor but are issued by a bank, called the 'issuing house', designated to handle the application. The allocation is decided by the bank and the broker in advance.

Basically the Stock Exchange is a market place for selling existing stocks and shares. The traders – or 'jobbers' – compete with each other for the business of buyers and sellers. But not everyone can just wander on to the Stock Exchange floor. This is the job of the broker and he goes into the market looking for the best bargain. Jobbers are like stall-holders and try to get the broker's business by offering the best prices to try to attract buyers and bidding the best prices to try to attract sellers.

All Stock Exchange member firms around the country are linked by telephone and closed-circuit television so that a broker in Aberdeen or Truro can deal with the jobbers as well as receiving the latest prices and information.

When he approaches a jobber, the broker will not say whether he wants to buy or sell. He will just ask the price. The jobber will give him two prices – one at which he will buy and one at which he will sell.

When the shareholder wants to sell some of his shares, he tells his broker, who goes to one of the Stock Exchange trading floors or makes contact by telephone, compares the jobbers' prices and sells at the highest price he can. When someone wants to buy, the broker will buy from the jobber at the lowest price. The broker can always choose between at least two jobbers in every share because the Stock Exchange insists that there must always be competition.

When a deal is made, the broker and the jobber each make a note of it in their dealing books: from that moment, with no piece of paper changing hands and no other evidence, the price is agreed and the shares become the buyer's. Only later is the paperwork completed. That is why the Stock Exchange motto – 'My word is my bond' – is so important.

Share prices fluctuate for many reasons. If more people want to buy than sell, prices go up: if more want to sell than buy, the price goes down. Shares in a successful company will tend to rise over a period, those of a less successful one will tend to fall. On some days, gloomy economic news might cause prices generally to fall but good, well-run and profitable companies will, over a period, find this success reflected in the price of their shares. The telecommunications field, for example, is seen as an example of a growth industry, with great potential.

So the Stock Exchange is a market. But why is it needed? Companies and governments need to raise new money. Companies can raise money by keeping profits in the business by increasing charges for products or services. But this is not always enough. So they borrow from the banks. The problem with bank borrowing, though, is that it may have to be paid back quickly.

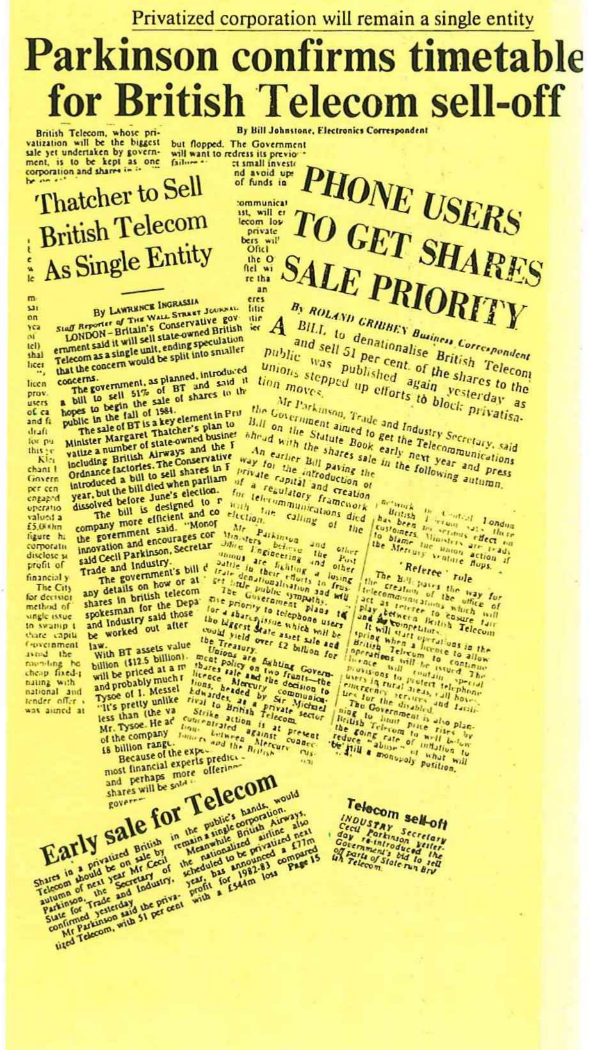
Alternatively, companies can raise extra cash through the Stock Exchange by an issue of loans or more shares. The money raised through issuing more shares does not have to be paid back by the company. Those who put the money up – the shareholders – can get their money back by selling the shares on the Stock Exchange. The company therefore has this money permanently to provide more jobs and to expand the business. The shareholder is taking a risk with his money but hopes for a good return if the company succeeds.

Companies now raise well over £1,000 million a year through the Stock Exchange – equivalent to £20 for every man, woman and child in the country. The Government raises even more, over ten times as much, on average, in recent years by issuing loans on the Stock Exchange.

Who actually buys all these stocks and shares? Some are bought by ordinary people from their savings, but most – more than half – are bought by pension funds, insurance companies and so on.

But it is impossible to capture the hustle and bustle of the Stock Exchange trading floor without experiencing it. Individuals are welcome to visit or parties of up to 40 can book through the Information and Press Department of the Stock Exchange, Old Broad Street, London EC2N 1HP. Telephone: 01-588 2355. Ⓣ

British Telecom Journal, Summer 1983



Privatized corporation will remain a single entity

Parkinson confirms timetable for British Telecom sell-off

By Bill Johnstone, Electronics Correspondent

British Telecom, whose privatization will be the biggest sale yet undertaken by government, is to be kept as one corporation and shares ...

but flopped. The Government will want to redress its previo...

Thatcher to Sell British Telecom As Single Entity

By Lawrence Ingrassia
Staff Reporter of The Wall Street Journal

LONDON – Britain's Conservative government said it will sell state-owned British Telecom as a single unit, ending speculation that the concern would be split into smaller concerns.

The government, as planned, introduced a bill to sell 51% of BT and said it hopes to begin the sale of shares to the public in the fall of 1984.

The sale of BT is a key element in Pri... Minister Margaret Thatcher's plan to ...vatize a number of state-owned busine... including British Airways and the ... Ordnance factories. The Conservative ... introduced a bill to sell shares in ... year, but the bill died when parliam... dissolved before June's election.

The bill is designed to ... company more efficient and co... the government said. "Monop... innovation and encourages co..." said Cecil Parkinson, Secretar... Trade and Industry.

The government's bill d... any details on how or at ... shares in British telecom ... spokesman for the Depa... and Industry said those ... be worked out after ... law.

With BT assets value... billion ($12.5 billion)... will be priced at a ... and probably much ... Tysoe of I. Messel ... "It's pretty unlike... less than (the va... Mr. Tysoe. He ad... of the company ... £8 billion range.

Because of the expe... most financial experts predic... and perhaps more offerin... shares will be sold ...

PHONE USERS TO GET SHARES SALE PRIORITY

By ROLAND GRIBBEN Business Correspondent

A BILL to denationalise British Telecom and sell 51 per cent. of the shares to the public was published again yesterday as unions stepped up efforts to block privatisation moves.

Mr Parkinson, Trade and Industry Secretary, said the Government aimed to get the Telecommunications Bill on the Statute Book early next year and press ahead with the shares sale in the following autumn.

An earlier Bill paving the way for the introduction of private capital and creation of a regulatory framework for telecommunications died with the calling of the election.

Mr Parkinson and other Ministers believe the Post Office Engineering and other unions are fighting a losing battle in their efforts to frustrate denationalisation and will get little public sympathy.

The Government plans to give priority to telephone users for a share issue which will be the biggest State asset sale and could yield over £2 billion for the Treasury.

Unions are fighting Government policy on two fronts—the shares sale and the decision to licence Mercury communications, headed by Sir Michael Edwardes, as a private sector rival to British Telecom.

Strike action is at present concentrated against connections between Mercury customers and the British ...

'Referee' role

The Bill paves the way for the creation of the office of telecommunications which will act as referee to ensure fair play between British Telecom and its competitors.

It will start operations in the spring when a licence to allow British Telecom to continue operations will be issued. The licence will contain special provisions to protect telephone users in rural areas, call boxes, emergency services and facilities for the disabled.

The Government is also planning to limit price rises by British Telecom to well below the going rate of inflation to reduce "abuse" of what will be still a monopoly position.

Early sale for Telecom

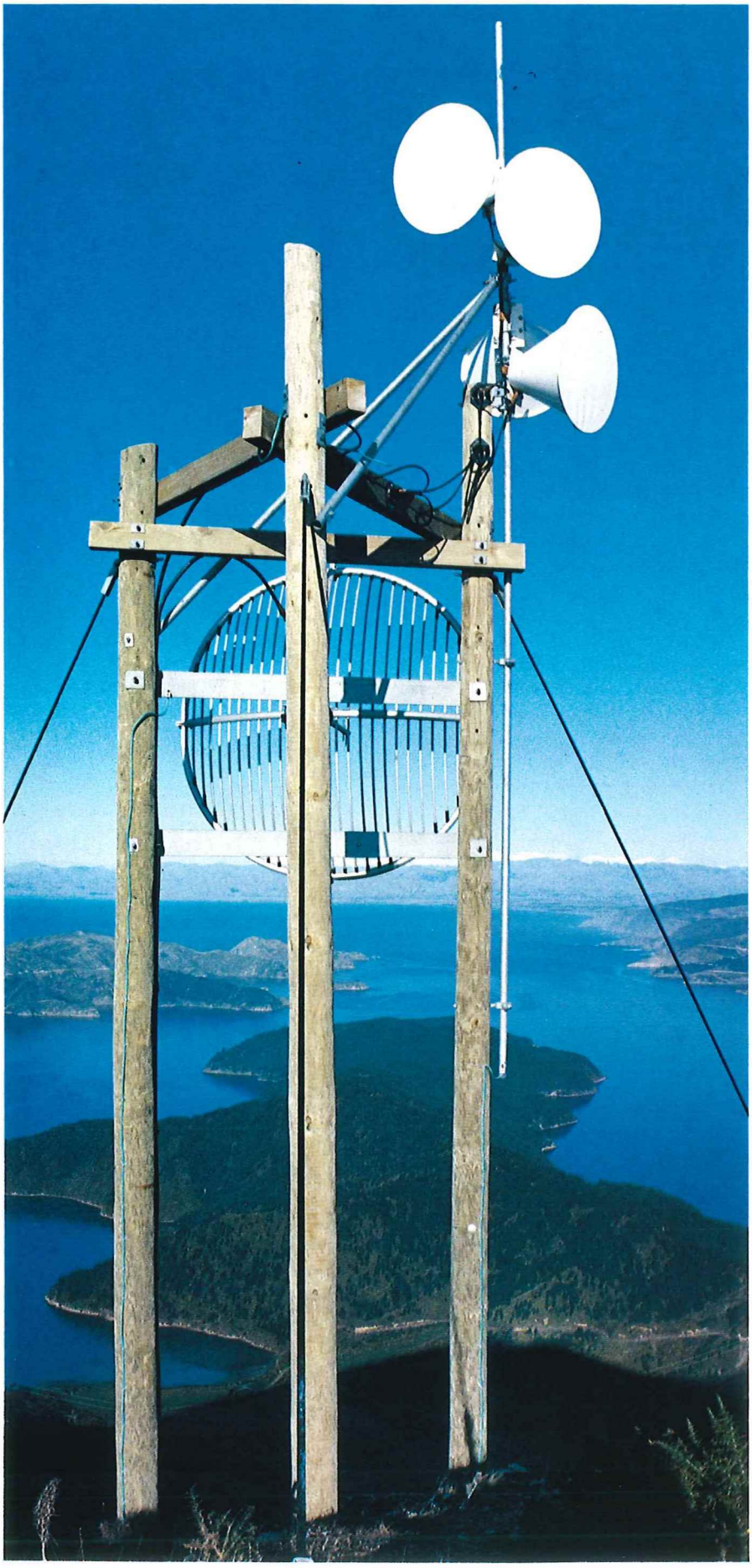
Shares in a privatized British Telecom should be on sale by autumn of next year Mr Cecil Parkinson, the Secretary of State for Trade and Industry, confirmed yesterday.

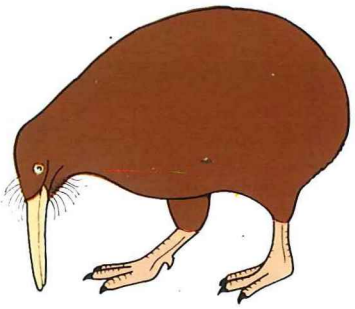
Mr Parkinson said the privatized Telecom, with 51 per cent in the public's hands, would remain a single corporation.

Meanwhile British Airways, the nationalized airline also scheduled to be privatized next year, has announced a £77m profit for 1982-83 compared with a £544m loss Page 15

Telecom sell-off

INDUSTRY Secretary Cecil Parkinson yesterday re-introduced the Government's bid to sell off parts of State-run British Telecom.





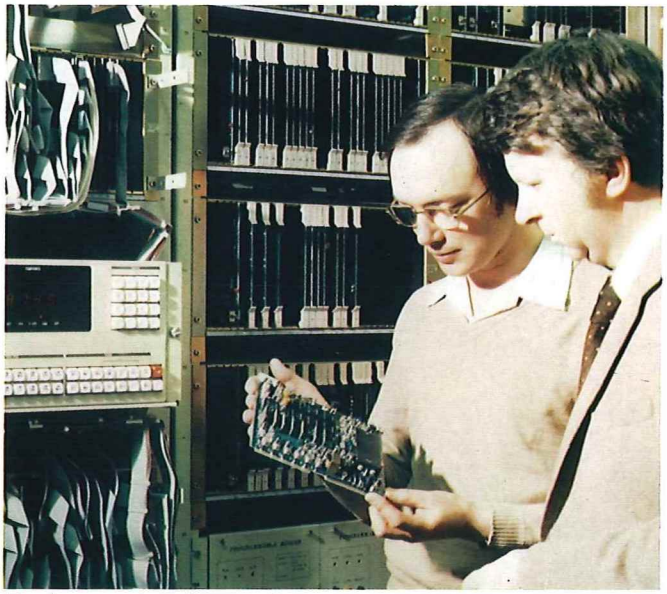
Expanding rapidly

This, the fourteenth in our series on overseas administrations, looks at the recent growth of New Zealand's telecommunications services.

New Zealand comprises two main islands, whose total area of 105,000 square miles is slightly larger than that of the United Kingdom. Population, however, is only 3.2 million, of whom about three quarters live on the smaller North Island. One in two New Zealanders lives in the principal cities of Auckland, Wellington, Christchurch and Dunedin, while only 16 per cent live in rural areas.

High above Marlborough Sounds, a wooden tower carries a subscriber multi-access radio system used to provide basic telephone service in remote areas.

New Zealand engineers haul in a spur of the new Anzcan cable at Takapuna Beach, Auckland.



Engineers examine equipment at a stored program control exchange.

As part of the British Commonwealth, New Zealand is a constitutional monarchy, with a parliamentary system based on that of the UK. The New Zealand Post Office (NZPO) is a government department, responsible for both posts and telecommunications, as well as running a Post Office Savings Bank. Its director-general reports to the New Zealand House of Representatives, who set regulations and prices according to government policy.

Headquarters of the NZPO are in Wellington, but control is devolved through two complementary structures. The engineering division functions through the Wellington headquarters and two other regional offices in Auckland and Christchurch to 14 district centres throughout the country, while the non-engineering division functions through 22 chief post offices, which also control the postal and savings bank operations.

The NZPO has a telecommunications monopoly, and provides telephone, telegraph, telex and data services as well as allocating and regulating radio frequency usage. Additionally, a number of circuits – often leased from NZPO – are operated by the New Zealand Broadcasting Corporation, the Ministry of Energy's Electricity Division, and the National Railways Corporation.

With 1.9 million telephones – 1.2 million connections – and over 0.59 telephones per head of population, penetration in New Zealand is about 10 per cent higher than in the UK. About 75 per cent of connections are served by Strowger exchange equipment, with the rest either crossbar (21 per cent) or manual (four per cent). With the opening of the first digital exchange in February last year, New Zealand has begun an equipment replacement programme which aims progressively to provide a highly efficient, nationwide, integrated services digital network.

Currently, STD is available to fewer than 60 per cent of customers: the remainder have to use operators at the toll offices to connect calls outside the toll-free calling area. A high priority is to extend STD as quickly as possible to cover the whole country. This, however, ranks behind the NZPO's development programme to upgrade the rural sector which includes plans for the conversion of the remaining manual exchanges, the upgrading of the many multi-party lines, and the replacement of old aerial lines with more efficient cabling systems.

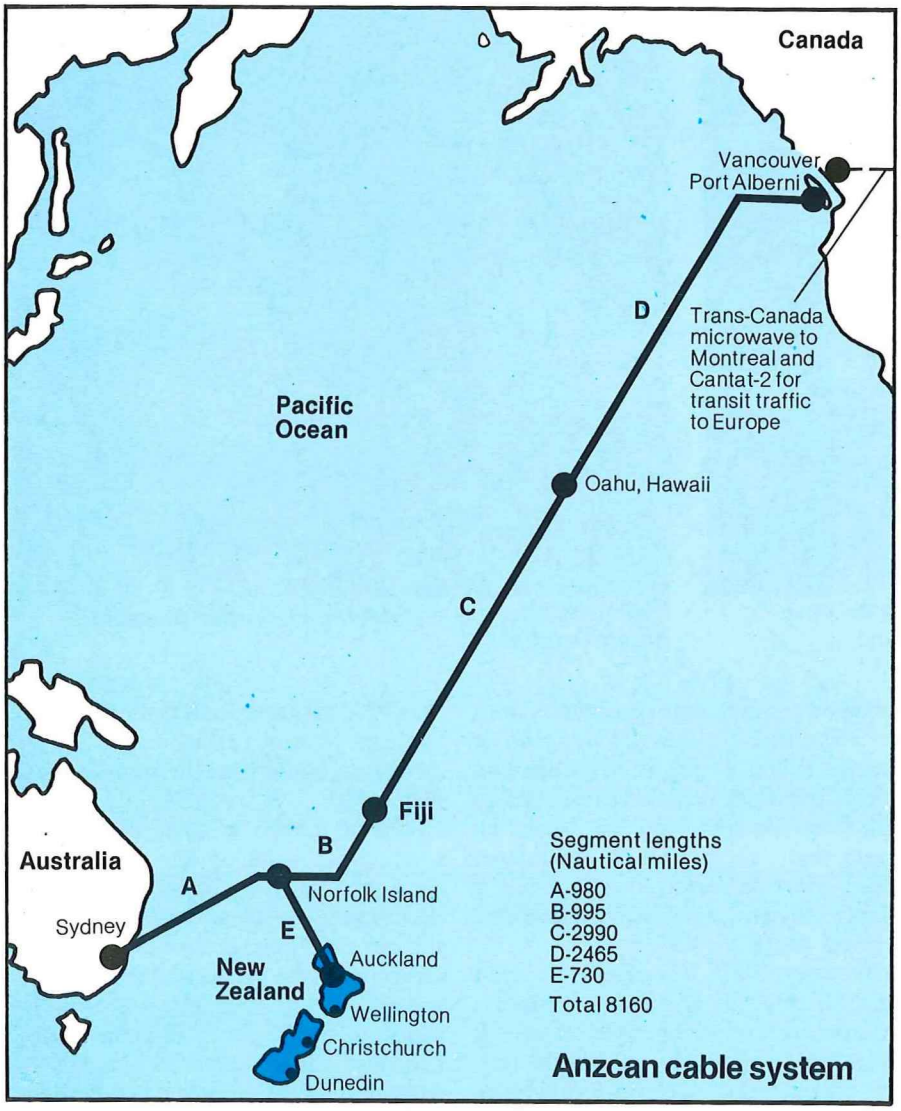
The policy of the NZPO is to allow customers to make free local calls to the town or city centre serving most of their daily needs. At present all but five per cent can do this with the country currently divided into 262 toll-free areas. It is the administration's intention to group the 797 local exchanges into 80 larger areas but this is largely dependent on the speed of replacement of manual exchanges and the augmentation of connection circuits.

It is aimed to complete the regrouping within 10 years, giving any customer free local call access on average to 15,000 connections, compared with about 5,000 at present. There is a large variation between exchanges, however, with more than 100,000 subscribers in the same toll-free zone in some urban areas, while for many rural subscribers the number is less than 1,000.

To take account of these differences, a complex rental system is applied. Customers pay not only according to the class of service – there are three business and one residential categories – but also according to the extent of shared service and the size of their toll-free area for which there are seven different steps. Cheapest annual rental is about £40, while the highest is more than eight times as much.

Cost of trunk calls is high, because they partially subsidise the free local calls and local calls from any of the country's 5,000 coinboxes, which are untimed but cost about 3p. Other supplementary toll services, such as person-to-person, transferred charge or urgent calls are relatively expensive. Priced according to the New Zealand structure, the typical UK residential customer's phone bill would rise marginally, while single-line business subscribers would pay more than half as much again.

Pulse code modulation systems are increasingly being used on trunk circuits, and the first fibre optic system has been installed in Wellington. In common with much of New Zealand's telecommunications equipment, the hardware is predominantly supplied by Japan. Both the NZPO and the Broadcasting Corporation of New Zealand (BCNZ) operate microwave links throughout the islands, the two routes being similar with sites often shared.



The main route runs north to south along the eastern coastline, and spurs link this with the other major areas of population. The Post Office network carries mostly telephone signals, but with additional provision for data and other signals such as radio programme material: television is carried exclusively by BCNZ's network.

While use of telegrams has continued to decline, in line with global trends, telex demand is growing at a steady eight per cent a year. About four per cent of the two and a half million telexes sent in 1981/82 were public messages. As well as making public telex booths available in main post offices, the NZPO operates a 'Phonatelex' service for non-subscribers, allowing messages to be passed by telephone to central bureaux from which telexes may be transmitted either within New Zealand or overseas.

New generation, stored program control (SPC) telex exchanges have been installed in Auckland and Wellington, reducing costs and allowing the introduction of new facilities such as datex – a 300 bit per second data and text communication system. This is more reliable and efficient than the current datel, which can operate at up to 2,400 bits per second but uses the switched telephone network.

Leased data circuits can provide speeds of up to 9,600 bits per second, and special circuits for even higher speeds are also available. Facsimile transmission has been extended through Bureaufax to allow public access at major district post offices, complementing the existing use of the public-switched telephone network with privately-owned terminal equipment. Planning continues for the introduction of packet switching, due to start this year.

Use of radio in New Zealand continues to increase as a means of communications, and more than 150,000 transmitters are currently licensed. Facilities for the land mobile radio-telephone service are provided by 100 base stations, catering for 7,200 subscribers and 60,000 radio-equipped vehicles. Privately operated services account for a further 13,000 licensed vehicles. A wide-area radiopaging service – Telepaging – is now becoming established in major cities and while the NZPO provides and maintains the service, receivers are produced and marketed by private industry.

For communications overseas, the satellite earth station at Warkworth connects New Zealand to other countries bordering the Pacific Ocean, via the satellite Intelsat IV. A total of 616 international circuits were in operation last year including those carried by the Tasman and Compac submarine cables. Compac, which crosses the Pacific, is reaching the end of its design life and contracts have been let for its successor, Anzcan, which is scheduled to be in service by 1985. Anzcan will connect New Zealand with Australia and Canada, being routed additionally via Norfolk Island, Fiji and Hawaii, with about 20 times the circuit capacity of Compac.

International direct dialling has been available in New Zealand since 1979, and 106 countries can now be accessed. Use of both international telephone and telex facilities continues to grow at rates of nearly 20 per cent a year, and access to US and Australia information services databases, recently available through a service called Oasis, grew at 60 per cent in 1981/82.

To cope with this spectacular progress, a contract was let last year for a new international gateway exchange – another of the ambitious expansion schemes planned by the NZPO which saw nearly £60 million allocated to capital investment in 1982/83, mostly for telecommunications. Almost half of this amount was met by the previous year's operating surplus.

Assuming there is no change in government policy, the combined programme of expansion and modernisation now underway should allow New Zealand to remain justifiably proud of its telecommunications system.

The authors – **Messrs P. H. Dabbs, D. A. Long, I. Sarwar** and **Ms C. M. C. Aust** are all members of the international comparisons and statistics group.
They acknowledge the help of the Telecommunications Division, Post Office Headquarters, Wellington.

British Telecom Journal, Summer 1983

The need for a major new study into the growth of data communications is currently being considered by the Eurodata Foundation.

It was estimated that in 1979 one million people throughout Europe used data communications as part of their normal daily work. By 1987 it has been predicted that this figure will be six million. Services like Teletex, Videotex and the electronic mailbox, continue to broaden the scope and flexibility of data communications and new networks and products are being introduced to meet the needs of the marketplace.

Monitoring this growth and change and forecasting future demand are tasks vital to the strategic planning activities of the European telecommunications authorities and it was to help them keep ahead of developments and ensure that opportunities for market expansion were fully anticipated, that Posts, Telecommunications and Telegraph authorities in Europe set up the Eurodata Foundation in 1976.

The Foundation originally comprised 17 PTTs of Western Europe, including British Telecom, and is a separate legal entity with the status of a foundation under Dutch law. Membership was increased to 18 in 1978 when Austria joined. The Foundation's registered office is in The Hague but its day-to-day business affairs are conducted from the management office in London, by staff on informal secondment from British Telecom. (See *Post Office Telecommunications Journal,* Spring 1979.)

The roots of the idea of the Eurodata Foundation go back to 1972 when a large-scale study of data communications in Europe was undertaken for the PTTs by consultants. Forecasts of a large growth in demand were produced but even these were eventually surpassed by the demand which arose, and by 1976, thoughts were trained towards a new large-scale investigation. There was also the growing recognition that a separate body was needed to set up, administer and finance such a project, so the Eurodata Foundation, under the auspices of the European Conference of Posts and Telecommunications (CEPT), was created to meet the requirement.

In March 1978 a study was commissioned to report on the growth and development of demand for data communica-

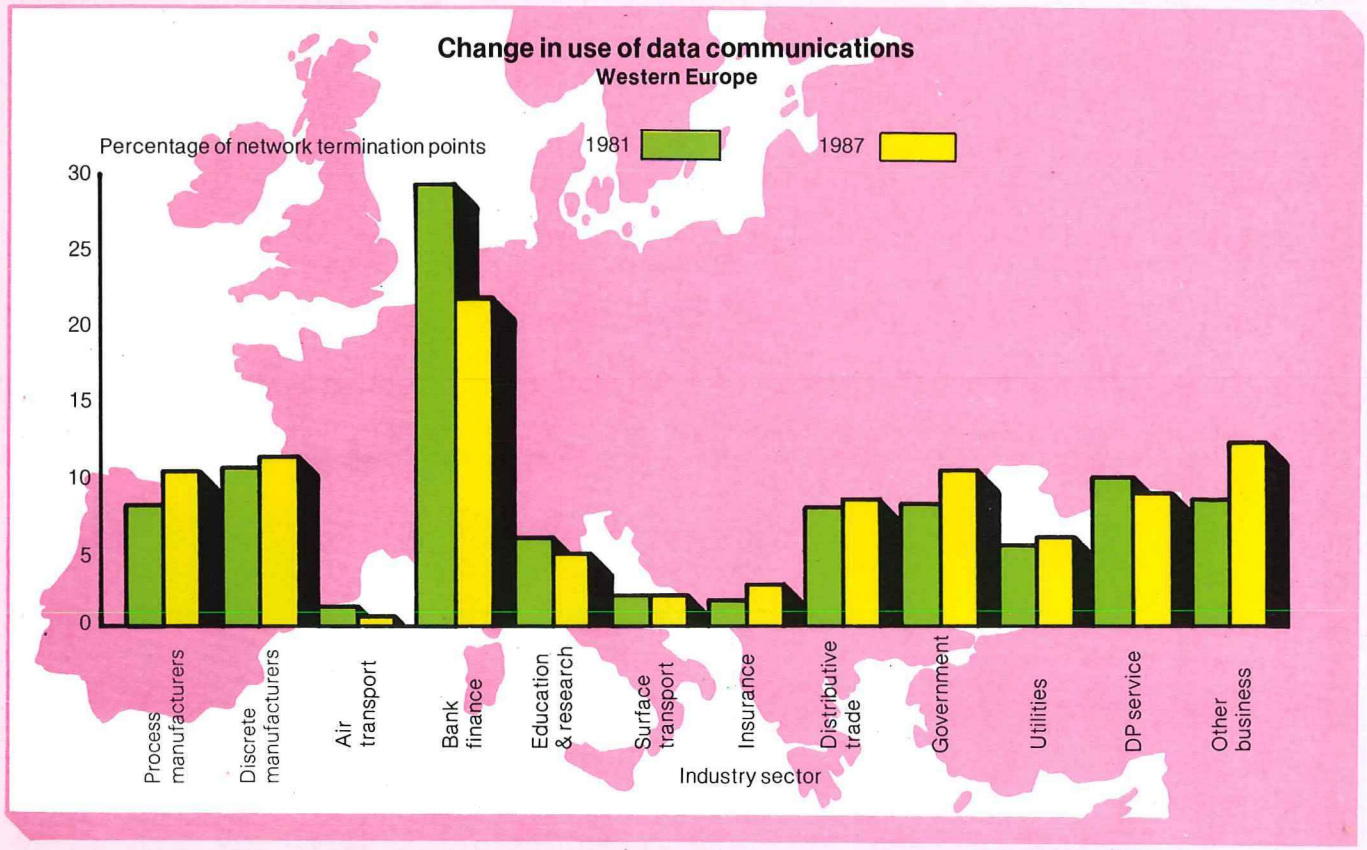
Here, the Eurodata Foundation team (from left, Linda Porter, Steve Valiant and Malcolm Acres) check the latest forecasts of data communication growth from their own database. Results are published and made available to member countries as well as being sold on a commercial basis.

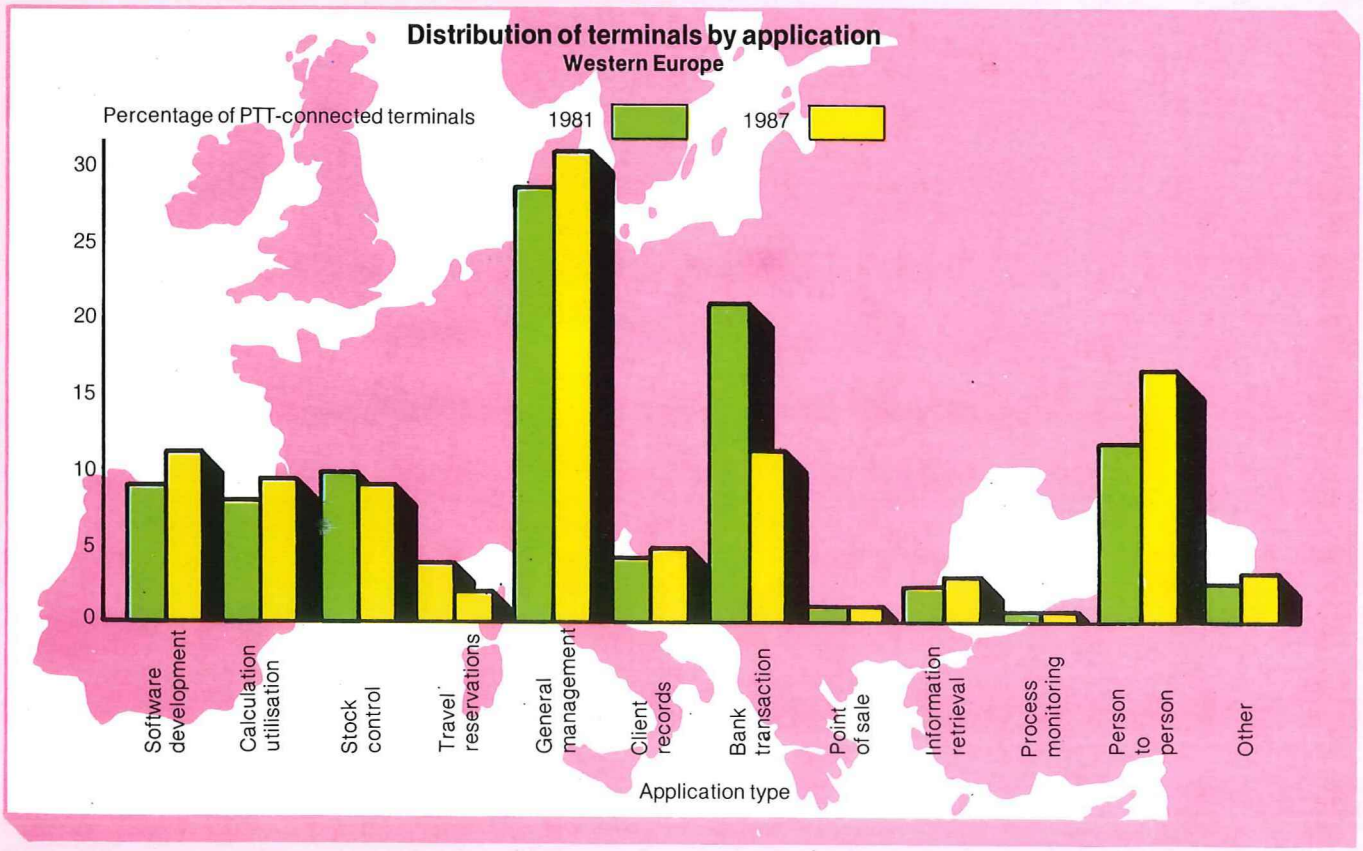
Steve Valiant

STRENGTHENING THE FOUNDATION

tions up to 1987. There was particular interest in the likely demand for connections to and use of the new public data networks, packet-switched and circuit-switched, which were being implemented or planned by the Foundation member PTTs. In addition, the growth of demand by application type and industry sector grouping was forecast, providing valuable marketing strategy guidance and highlighting what were the likely dominant market sector growth factors.

The main conclusions of the study were clear. It was forecast that the number of data connections in Europe would grow fourfold to 1.6 million by 1987 with a corresponding sixfold increase in the terminal population to nearly four million and a sevenfold increase in volume to 100 million bits per day. In 1979, the UK had the largest number of data connections (117,000) and it was forecast that this lead would continue to 1987. Sweden





had the highest penetration of data connections per 1,000 working population (5.7) and it would retain and extend this lead by 1987.

One of the most significant predictions of Eurodata 79 was the high demand forecast for the new public data networks, particularly those using packet-switching. By 1987, one in three data connections would be to these public data networks. The latest indications suggest that this forecast is likely to turn out to be optimistic and the ratio now expected is nearer one in five. The underlying demand trend remains, however.

Inevitably, when forecasting, assumptions have to be made. Those applied to Eurodata 79 were valid then but time has shown a number of them to be in need of revision. The Foundation member PTTs decided therefore to re-run the computer forecasting models late in 1981 and early last year, using latest available statistics and revising a number of the earlier assumptions.

This exercise confirmed many of the trends forecast, but also highlighted a number of differences when compared with the original results. The large growth in demand was forecast to persist but revised introduction dates for public data networks and early evidence of slower take-up by the market, gave forecasts of a smaller likely population by 1987. Certain differences in the trends toward higher speed working were also highlighted.

The exercise demonstrated, however, that regular revision of assumptions and renewed production of forecasts were valuable inputs to planning within the PTTs and the project is scheduled to be repeated this year. The time horizon will be moved forward to 1991. This year's re-run, like the last, will use the original computer models installed on a Univac mainframe in Madrid and accessed by Data Processing Executive staff via network nodes in London.

Because of the changes taking place, however, and the dawning of the age of integration and office automation, new approaches need to be developed. Accordingly, the Foundation has been given the task of investigating the need for a new major study and how an examination of the growth and development of demand for non-voice services to 1995 might best meet the needs of the member PTTs. Since each of the European administrations also conducts its own research for strategic planning, it is important that a new study, like the previous ones, should provide real benefits from the international and multi-national dimensions. These benefits must be provided for both the large and advanced administrations such as British Telecom and the smaller administrations or those with less well-developed markets.

Evidence from the 1972 and 1979 studies shows that real advantages can be obtained from well-conducted studies undertaken by the PTTs of Europe collectively. There is, of course, a straightforward financial advantage as a result of pooling resources and inventing the required wheel once only, but joint co-operation by Foundation members extends beyond the financial considerations. Other valuable resources such as expertise, data and experience are combined to mutual advantage.

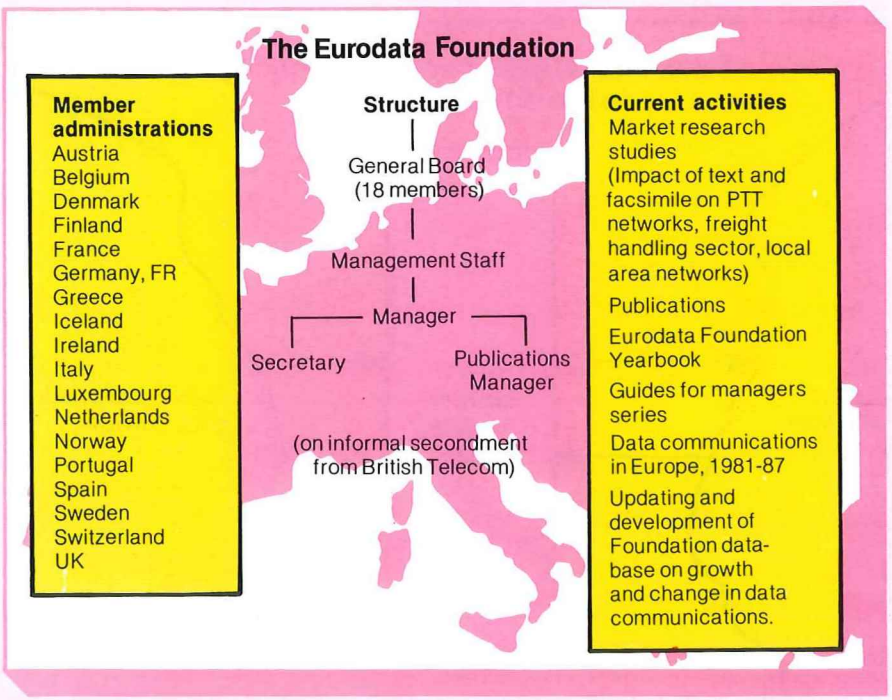
This approach provides significant benefits since it is rare to find that any one country has available the complete range of information and statistics to realise the full potential of a large-scale investigation. Where such gaps exist, the collective approach allows them to be filled and sparse evidence can be strengthened by gathering information from a number of sources throughout Europe.

The Foundation has now started to investigate seriously its next major study. Early exchanges of ideas have suggested that a number of changes will take place by 1995 and these will raise many issues for the PTTs of Europe. Office automation will open up whole new market areas for non-voice services and products and the traditional data communications market is being altered by the developing trend towards distributed data processing. The development of text communications services in particular is expected to forge ahead quickly in Europe, and integrated terminal devices and work stations are likely to play an important role.

Opportunities will be created for more value-added network services. Existing networks usage will continue to grow and the public data networks will firmly establish themselves during the course of this decade. New networks such as ISDN, satellite and cable television will be opened up in many European countries and their introduction will raise significant issues.

These issues form the background to the present deliberations on a new European study, but, of course, at the heart of the developing marketplace, and the opportunities it will provide, is the customer and the communications applications needed to run his or her business. The proposed study must examine these applications and assess how non-voice services will need to develop to meet customers' needs.

There is much discussion required still before firm proposals can be drawn up and the framework of such an important study takes shape. Speedy progress could ensure that a new study starts next year with its results available by the middle of 1985. This timing would certainly be beneficial to the Foundation PTTs for many of the issues to be covered. The challenges of formulating suitable proposals and guiding discussions to a successful conclusion are being firmly taken up by the Foundation as major tasks this year.



Mr S. Valiant is the Eurodata Foundation manager.

Major boost for telex users

Bob Brown

British Telecom has taken a further step forward in meeting the needs of today's modern business community, by introducing an interworking gateway allowing telex users and packet-switching service (PSS) users to communicate with each other. This is a major development in the UK's 50-year-old telex service.

After the public switched data network (PSDN) became operational in the UK with the implementation of PSS – also known as SwitchStream One – it became clear that there was a demand from telex users to gain access to and from the PSDN. Besides enabling PSS and telex users to communicate with each other, it was also forecast that there was a demand from telex users to gain access to PSS hosts offering databases and electronic mail.

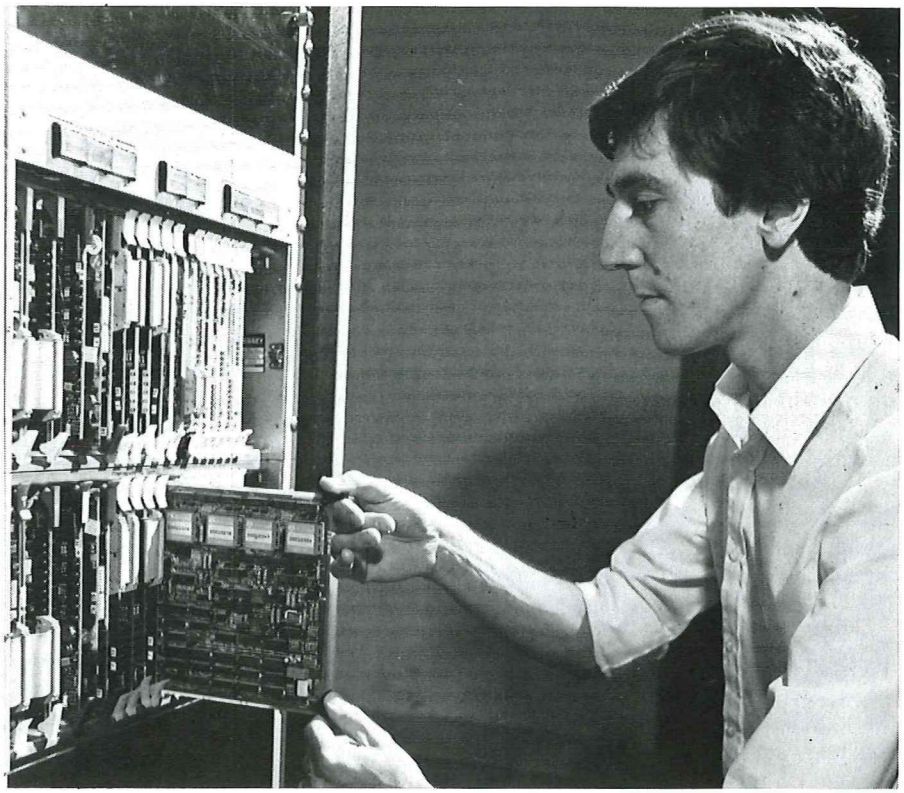
With more than 90,000 telex terminals in the UK and a rapidly growing PSS, a significant amount of traffic between both networks was anticipated. The equipment providing interconnection is known in British Telecom as the telex network adapter (TNA) and to the public as Interstream One and has been developed by Plessey Controls Limited. It has been designed using modern stored program control (SPC) techniques and has been installed at Fleet Exchange in the City of London.

All telex users in the UK can gain immediate access to the TNA simply by dialling the special code 20083. They may then select a PSS packet or character terminal by typing in the network user address (NUA). This consists of the full data network identification code (DNIC) followed by the PSS network terminal number.

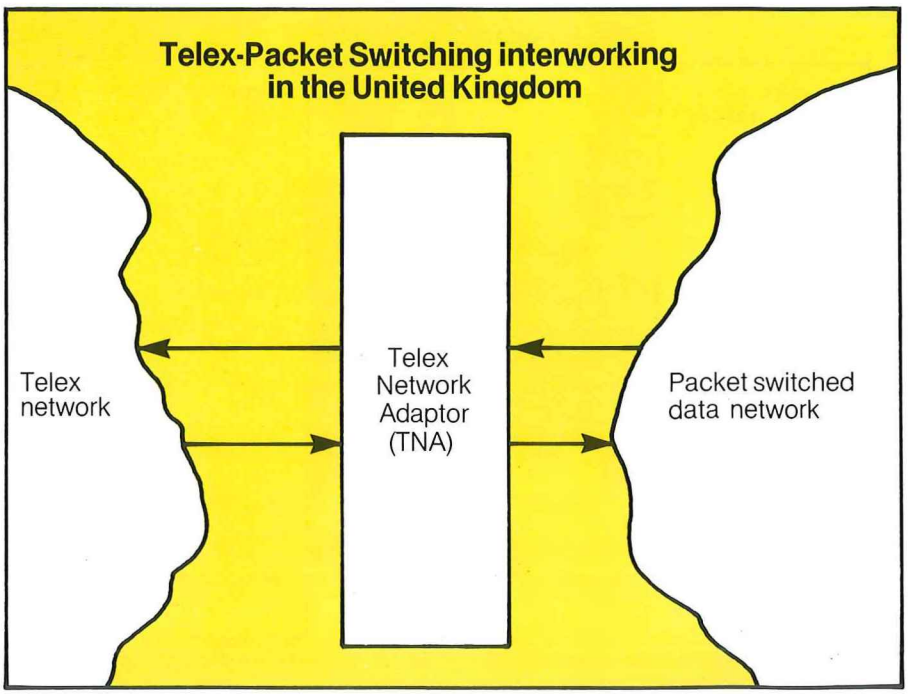
PSS customers in the UK can access the TNA by using the code 2348 in their call request packet followed by the user's national telex number. The modern executive on the move, armed with his portable data terminal with built-in acoustic coupler, can now access all telex terminals by dialling into PSS from any ordinary telephone if he has a network user identity registered on PSS. Today's modern portable data terminal is incorporated in an executive style briefcase.

Initially, the service will enable telex users to access users of the inland packet switched data networks and vice versa. Access to overseas packet switched data networks is planned later via the international packet switched service (IPSS), and the list of overseas destinations available still grows.

But with more than a million telex users worldwide in over 170 overseas countries, market research conducted for British Telecom has shown that overseas



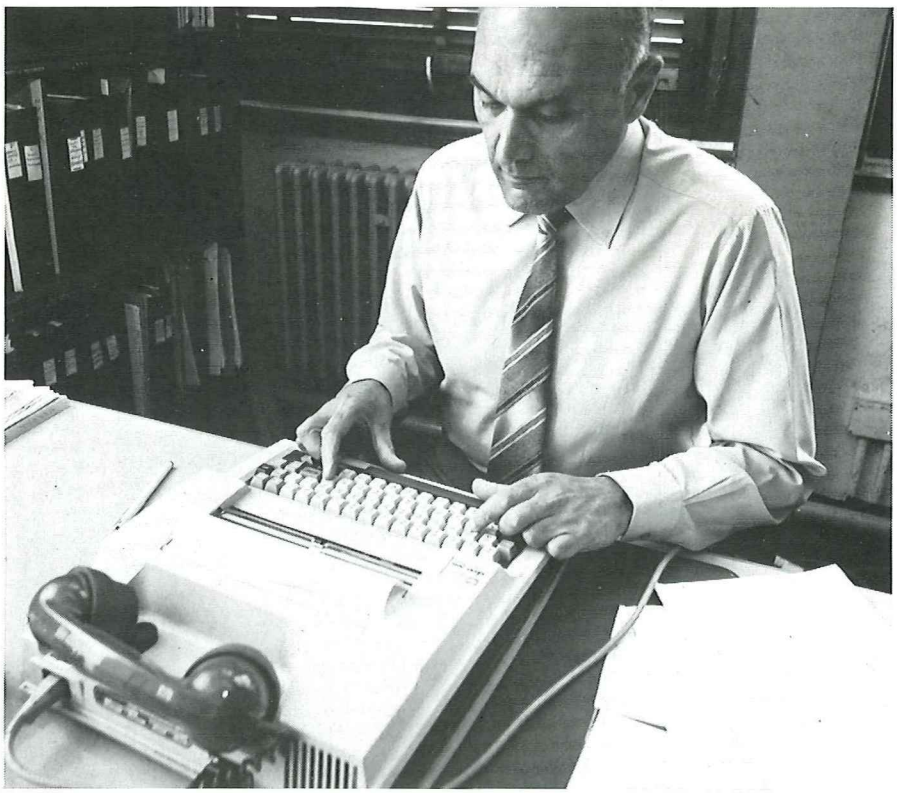
Technical officer Derek Cripps removes the bubble memory card in the TNA at Fleet Building, London, to perform a data update on a spare card.



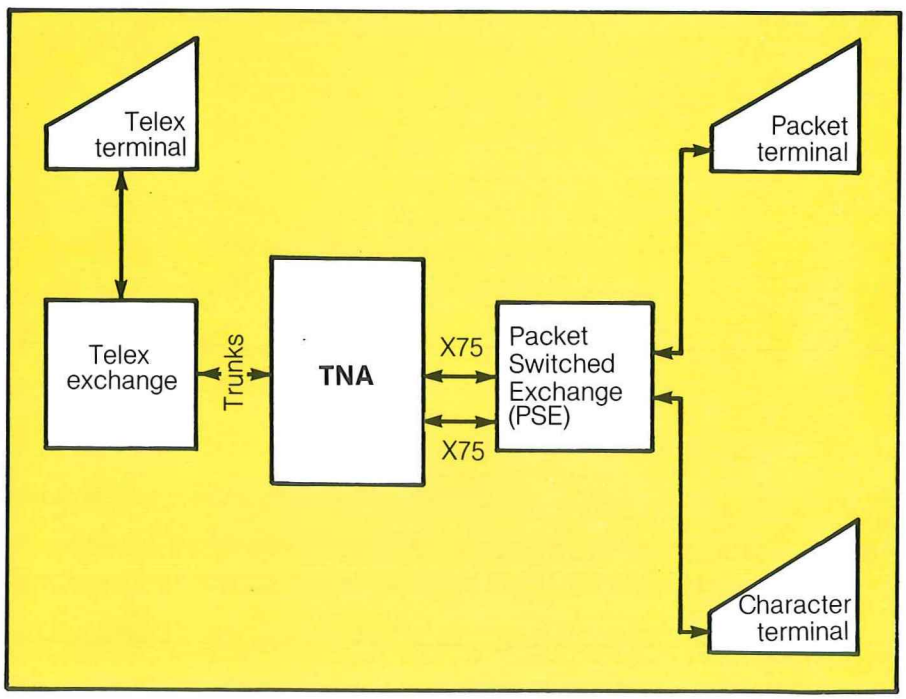
international telex working, especially incoming, will greatly increase the demand for the TNA facility. For this reason, it is planned to provide international telex working as soon as the equipment has been modified.

The TNA is a development of the Plessey 4660/20 system which is known within British Telecom as the inland telex line connector (ITLC) (see *British Telecom Journal* Winter 1981/82). A number of ITLCs are being used by British Telecom to overcome temporary shortages of Strowger exchange connection points. This model is the smallest member of the Plessey 4660 family of systems, larger versions of which have been providing international telex gateway facilities for some years. By coincidence, the first ever TNA has been located next to the ITLC installed at Fleet Inland telex exchange.

Using the TNA, a telex customer can call a packet terminal, or a character terminal. As well as converting codes and transmission speeds, the TNA acts as a packet assembler/disassembler (PAD) to pack data into 'packets' for transmission through the packet network, and to unpack the data for delivery to telex and character mode terminals. Telex teleprinters and PSS terminals work to different alphabet standards, so the telex characters are stored sequentially in data packets and forwarded, subject to flow control, to the packet switching exchange (PSE). The TNA is connected to the PSE at Baynard House through two 48 kbits tandem links. Calls are charged by standard telex network metering and revenue for the use of TNA and PSS is collected using the PSS billing program suite.



A PSS registered customer uses a portable data terminal to make a telex call from an ordinary telephone via the TNA.



The basic 4660/20 system has a stored program control time-division multiplexed switch with enough paths to ensure that an originated call never encounters a 'busy' signal. The equipment is controlled by a General Automation 16/240 microprocessor, through which all signalling and data traffic passes. The terminator module controllers control four terminator group controllers (TGC). The TGC deals with character transmission and signalling, thus easing the load placed on the central microprocessor.

TNA is based on the on-line/warm standby principle where any item of equipment affecting more than 16 ports is duplicated. The on-line system handles all functions of the TNA and in the event of the on-line system failing the standby takes over. Although all calls in progress are cleared down, a record of the cleared calls held on the standby means that service signals can be sent to customers. The TNA equipment is supplied with main random access memory backed up by further memory capacity stored in magnetic form on a molecular 'bubble'. This is used if a fault in the on-line system causes memory loss on the main memory and then a subsequent fault occurs on the duplicate equipment.

Future telex developments may include access to PSS mailboxes, databases, and will certainly include teletex. And with plans to combine the existing telex store and forward message delivery service with PSS interworking, the telex service is clearly contributing to the age of the electronic office and information technology. ⓣ

Mr R. S. Brown is a head of group in the Telex Division of National Networks Special Services with responsibility for developing the TNA.

Small-dish recipe for success

John Hardy

Fast reliable communications are essential to modern business. With the advent of ever more sophisticated telecommunication devices – high-resolution facsimile, electronic mail, teleconferencing – and the convergence of telecommunications and computing, demand continues to increase for advanced communication facilities. These are not always readily or economically handled within existing analogue networks.

Changing the UK national network from analogue to digital working continues to progress rapidly with both the installation of new exchanges and a new range of digital leased facilities becoming available to business customers – SwitchStream, KiloStream and MegaStream. One of the roles of British Telecom International (BTI) is to provide access from the UK to other countries throughout the world to exploit the advantages of digital working.

An essential part is the introduction of digital small-dish satellite services, known as SatStream. BTI has used earth satellites for international communications since Early Bird (Intelsat I) was launched in 1965, and is now the second largest user of the Intelsat system. To get the greatest use from satellite capacity and because the frequencies until now are shared in many countries with other services, most administrations use large earth stations in rural areas. In the UK, these antenna 'farms' are at Goonhilly in Cornwall and Madley in Herefordshire. These large

This dish aerial on British Telecom's Fleet Building in London is being used for SatStream experiments with the orbital test satellite.

dishes will be used to provide international digital services, but their usefulness is limited to the access possible through national digital networks which are at varying stages of development.

Small-dish satellite services on the other hand can use frequency bands not shared with other services, and earth terminals small enough to be located on the premises of, or close to, the user. They can provide an international overlay independent of national digital networks, thus offering digital transmission facilities at the earliest opportunity. Since the earth terminal is close to the customer, much greater use can be made of facilities for which satellites are better suited than terrestrial networks. SatStream is ideal for:

★ Point-to-multipoint communication where the same information is received simultaneously by a number of small dishes.

★ Company networks to meet requirements for flexible systems which can be rapidly expanded or altered.

★ Temporary or urgent communications using transportable small-dishes. For instance, the one which will be used in October at Telecom 83 in Geneva.

★ Providing advanced communications to customers in remote places difficult to serve by other means. For instance, BTI recently conducted an experiment using the orbital test satellite (OTS) between Amoco (UK) Exploration Company's Montrose Alpha platform in the North Sea and their Aberdeen office.

SatStream Europe – available from next year – will use capacity on the European communications satellite (ECS) and the Telecom 1 satellite systems.

The standard earth terminals will vary in size between 3.5 and 5 metres in diameter. The antenna can be mounted on a roof or at ground level, and the associated radio equipment housed nearby either in the building or in a cabin. As well as terminals on a customer's own premises for their exclusive use, BTI will also place terminals in the centre of major cities in the UK to serve customers in the immediate vicinity. Since the earth terminal could represent a major portion of the overall cost of a customer's small-dish network, it makes economic sense to share terminals for comparatively low usage. The customer will be connected to the terminal by dedicated links – using the most reliable, quickly provided and cost-effective means available, including the equipment developed for MegaStream and KiloStream, microwave and optical fibres.

The benefits of digital transmission, particularly at high speeds on a part-time basis, are clear. SatStream applications for a company could include:

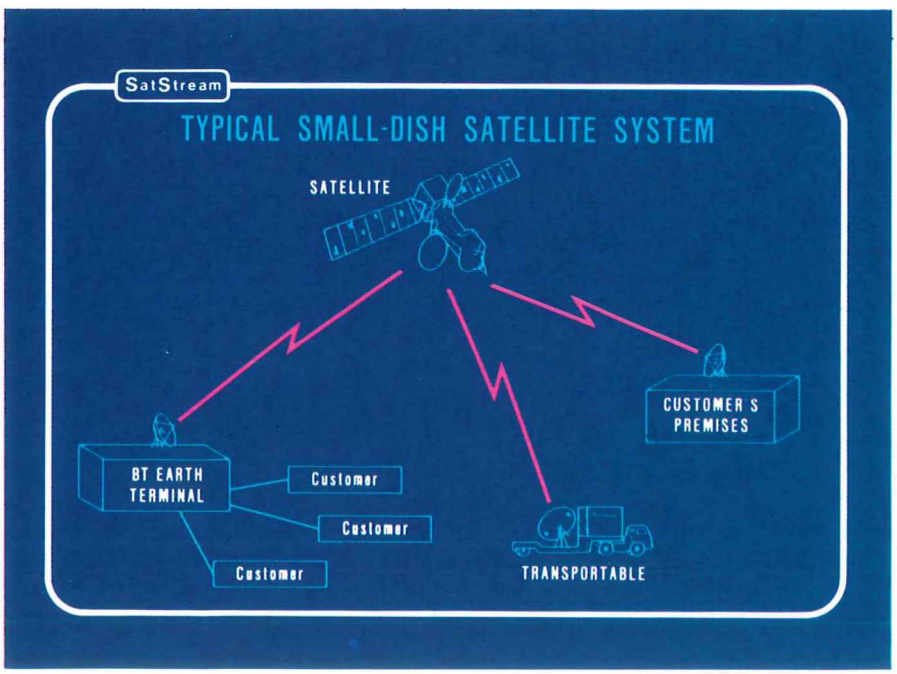
★ Bulk-file transfer at speeds of up to 1920 kbit/s between computers. For instance, overnight high-speed transfer at off-peak tariffs between duplicate computer centres replacing the physical transportation of tapes by courier; or batch processing; or resource sharing.

★ File dumping: the user could interrogate a database at low speed, while the information requested is delivered at a much higher speed using a one-way channel. One example is the holding of blueprints or published information in a digital archive (instead of on paper or microfiche) with the facility to distribute copies quickly throughout Europe. Another is interacting with remotely-located computer-aided design equipment.

★ The interconnection of local area networks to create a wide area network. British Telecom is a partner in Project Universe – an experiment using OTS and six small-dish earth terminals to interconnect Cambridge Rings. This will also be demonstrated at Telecom 83.

★ The use of one-way point-to-multipoint transmission to deliver quickly the same information to many places. The current OTS experiment by BTI and the Exchange Telegraph Company is examining the commercial and technical practicabilities of this. Low-speed data and voice is being transmitted to 11 receive-only ter-

One of British Telecom's transportable terminals on the road.



minals with antennae diameters of 1.8 metre or 1 metre spread throughout the UK.

Image applications can similarly benefit. Group 3 office facsimile machines are still comparatively slow, and the next generation of machines working at 64 kbit/s are already being developed. Telecom 83 should reveal when they will become commercially available. Integrated electronic work stations, where the material already exists in digital form, have started to appear. SatStream can provide flexible transmission facilities between their controllers. Specialist applications include the use of high-speed facsimile machines or digital compositors in the simultaneous printing of newspapers at several places rather than the expensive transportation of bulky printed papers.

SatStream offers higher digital speeds than are possible now, and on a point-to-multipoint basis. BTI and the Deutsche Bundespost, with the *Financial Times*, demonstrated for the first time in Europe the remote printing of a newspaper using small-dish terminals. During the experiment, the transmitting station was installed on the roof of the *Financial Times* building in London and the receive-only terminal on the premises of Frankfurter Societäts Druckerei in Frankfurt where the *FT's* international edition is published. Digital transmission can also be for voice and SatStream could offer:

★ Digitised voice compression techniques, which are currently the subject of considerable research and development. The customer can choose the balance in compression rates between cost and quality that matches his requirements, and take advantage of technical developments during the life of the system.

★ The links between digital private branch exchanges to spread the benefits throughout the network. In many ways this is a variant on Local Area Networks and there is increasing convergence by combining data and speech on the same digital highway.

Teleconferencing increasingly offers a flexible, cost-effective way of improving a company's performance. The ability to arrange meetings at short notice and to involve more participants than might be the case otherwise is as important as the savings in time and costs of travel. Methods range from voice-only conferencing (for example using PBXs), audiographic where slow-scan or fast facsimile is used to supplement voice to full-motion colour videoconferencing from desk-top terminals to high-quality studios. BTI's demonstration at Geneva will use small dishes to provide a video-conferencing link between the exhibition and a studio in London.

A recent Intelsat meeting at Eastbourne in the UK was opened by the Chief Executive of BTI's International Business Services from London with a video link using a fixed SatStream terminal in London, OTS, and a transportable small-dish earth terminal in the car park of the hotel at Eastbourne. The picture and sound quality were excellent.

SatStream Europe is just the beginning. Recently, Intelsat decided to provide satellite capacity for digital business services capable of operation via small dish terminals. A pilot service to North America, initially using frequency bands shared with other services, could be available by the beginning of next year, and by 1986, a commercial service – SatStream North America – may well be operating in dedicated frequency bands opening the door to SatStream services to other parts of the world.

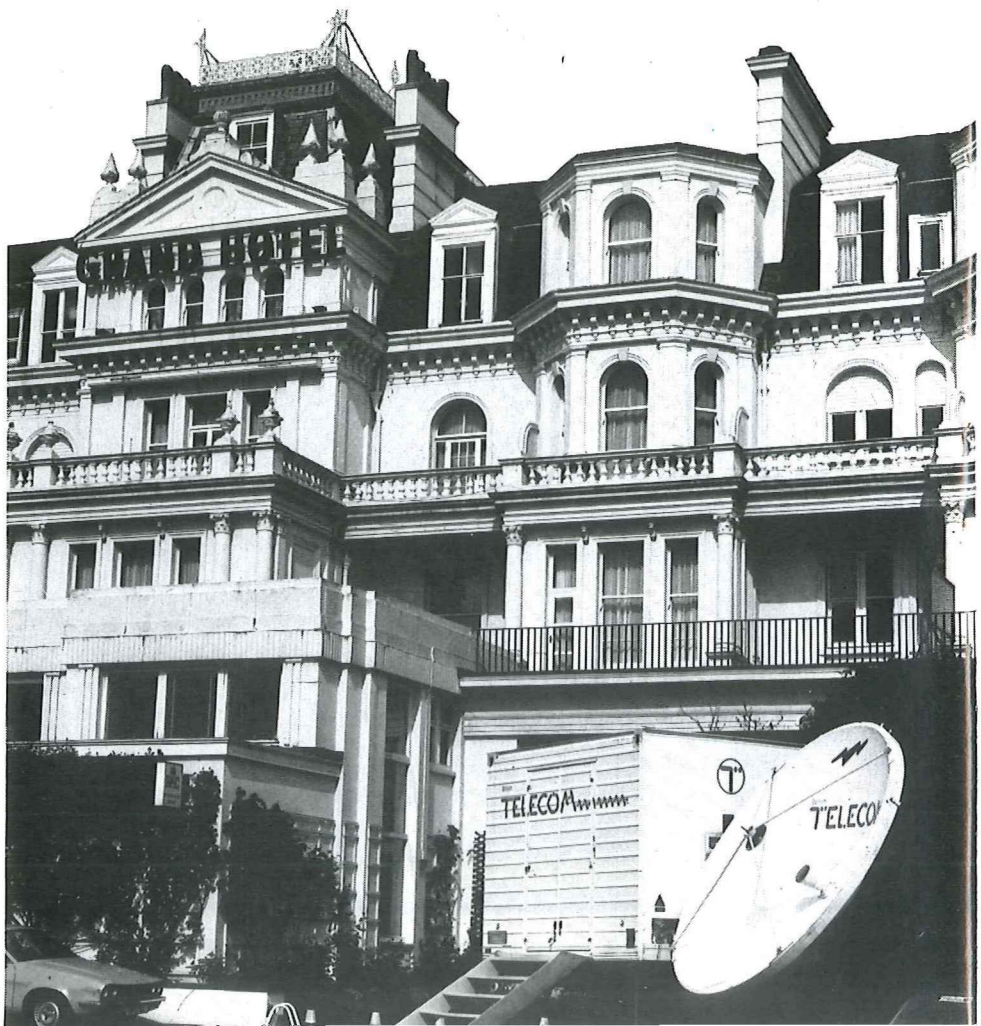
But British Telecom is developing small-dish services not only for business use, but also for television distribution. BTI already runs a pre-operational service via OTS, distributing television programmes from the UK to cable television networks in Europe. Operational services to Europe will be available later via ECS. British Telecom is also one of the three partners in United Satellites Ltd, the consortium which will launch Unisat – a three-satellite system – during 1986. The satellites will carry high-powered transponders for a television direct broadcasting service (DBS) and low-powered telecom transponders which will be leased by BTI to provide programme distribution links to cable television networks and SatStream business services.

British Telecom has a strong commitment to this new technology as demonstrated by its involvement in the various OTS experiments, and its resolve to bring the SatStream services to the customer as soon as possible in the way most suited to the needs of the international business community. And before long, SatStream Europe and SatStream North America will be providing fast digital communications to Western Europe and across the Atlantic.

Mr J. Hardy is head of British Telecom International's SatStream marketing group.

British Telecom Journal, Summer 1983

A British Telecom transportable terminal outside Eastbourne's Grand Hotel for the video relay of the opening address from a British Telecom conference studio in London to an Intelsat meeting.



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Prince Charles opens exhibition

British Telecom has played an important role in setting up the Science Museum's 'Telecommunications – a Technology for Change' exhibition which was opened earlier this year by the Prince of Wales. The aim of the exhibition – to mark the centenary of Standard Telephones and Cables – is to present a simple but effective panorama of telecommunications systems from the past, present and foreseeable future.

British Telecom's contribution to the exhibition has mainly been in terms of equipment and operational experience but much technical advice has also been given in the production of exhibits. Displays have been specially designed and constructed to meet specific needs and considerable thought was required to establish the correct technological level.

Telecom Technology Showcase has, in the main, provided the historical link and several items have been sent, including a concrete telephone kiosk recovered from Lingfield Park racecourse. A 'hole in the road' is given some prominence and the theme is that even in the age of microelectronics, servicing and repair of underground cables is still essential. The Hitchin-Stevenage fibre optical communications system is shown and as a further example of external plant – albeit pre-1900 vintage – there is a telephone pole complete with overhead linesman model and tools.

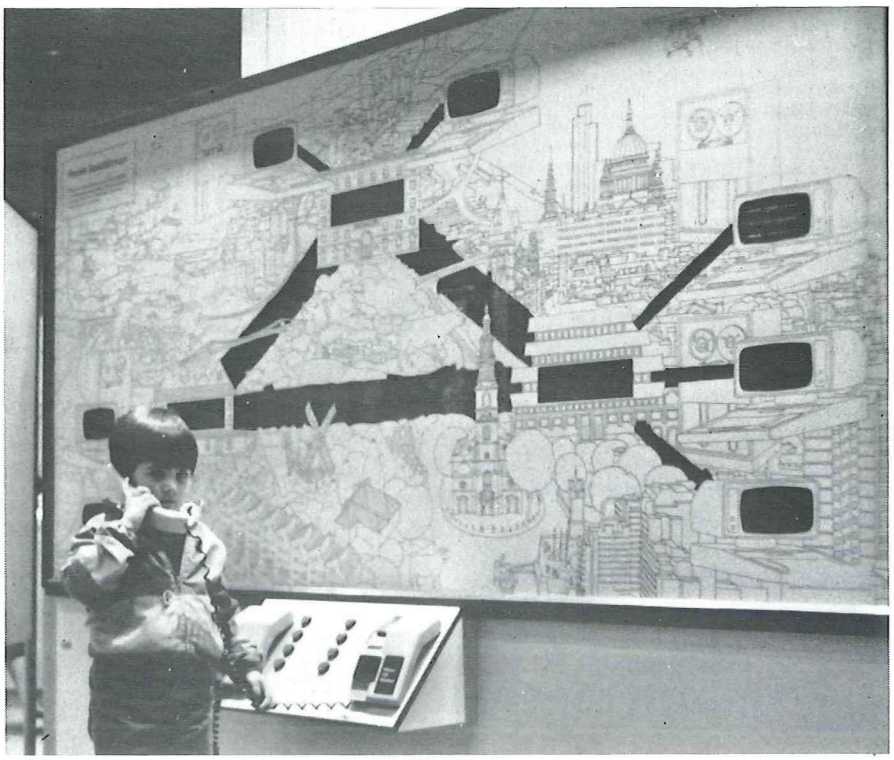
Early submerged repeaters of the type used to link Holyhead with the Isle of Man and also the 1950 TAT-1 submarine cable repeater are included to represent the pioneering days in this technology and examples of deep-sea cables damaged by trawling, and cable trenching equipment reinforce the important role played by British Telecom cableships.

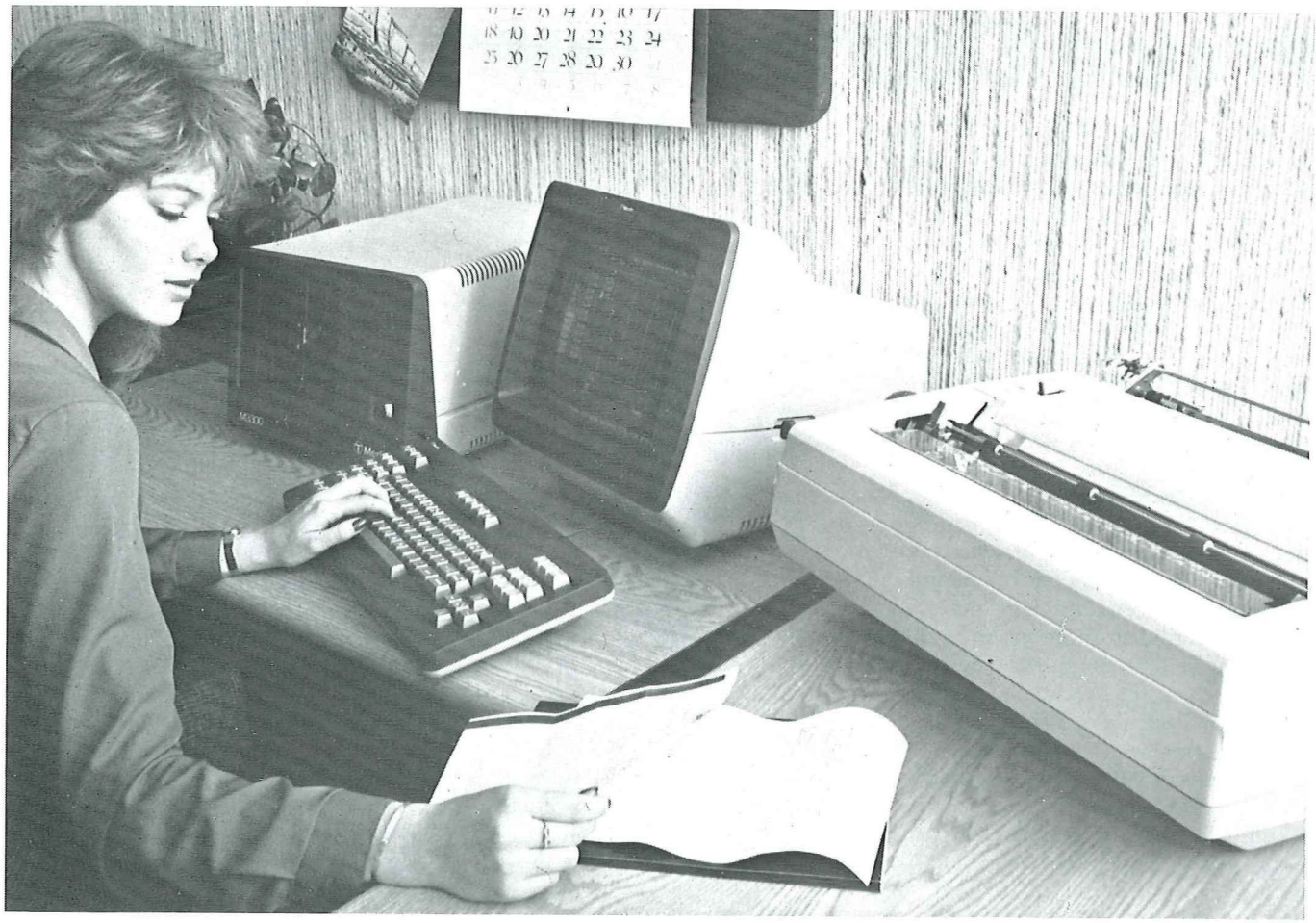
Heavily involved in producing working exhibits to enable visitors to press buttons was Inland Division's London Circuit Laboratory. They have been responsible for six major exhibits ranging from Strowger equipment in action and principles of packet switching to System X technology, and pulse code modulation.

It is hoped that British Telecom's commitment to the exhibition will be a source of interest and education to all who visit and will continue the policy of developing public awareness in the past and interest in the future. The exhibition will be open for a year.

The Prince of Wales presses a button to operate an optical fibre link unveiling a plaque in the new telecommunications gallery at the Science Museum. The exhibition – Telecommunications, a Technology for Change – is one of the main UK events in World Communications Year, and is sponsored by Standard Telephones and Cables. Their chairman, Sir Kenneth Corfield, describes the process to Prince Charles.

Inland Division's London Circuit Laboratory played a major part in setting up many of the working exhibits.





Merlin's M3300 communicating word-processor offers push-button access to the telex network via a Puma teleprinter as well as a wide range of other services.

Computer wizardry!

British Telecom – through its new business equipment arm Merlin – has extended its involvement in the office automation field with the recent launch of a personal computer, word processor, communicating visual display unit terminal and printers. Initially the products will be available in parts of London and the Home Counties but will be extended nationally over the next few months.

The new range – supplied to British Telecom by ICL – has significant new performance features based on five important principles.

★ Commitment to proven technology, but with evolutionary potential.
★ Open systems, simplifying communication between different machines.
★ User friendliness.
★ First class service and software back-up.
★ Good value for money.

With communications and computing coming together ever more rapidly, it makes sound commercial sense for British Telecom to include office automation terminals and software as part of its involvement in the information technology market.

For more than 20 years, British Telecom has been a leader in computer communications and, as Europe's largest computer user, it has wide experience of data processing. The new products represent a modest beginning in a different sector of information technology. British Telecom's main aim is to establish a nationwide sales and maintenance service and to establish worthwhile sales.

Star of the range is the M2226 small business computer. It has 5 Mbytes of memory, Winchester disk drive storage, as well as 800 Kbytes on floppy disk. With a wide range of communications it can access private and public databases

About Merlin

Merlin is both a brand and a profit-centred business within British Telecom. It was established last year to bring together products and services previously known as British Telecom Business Products and Systems and related new ventures in information technology.

Its products include call-connect systems such as Monarch, Herald and Regent; Puma and Cheetah electronic telex terminals; and data modem-based products.

This year Merlin has entered the office automation field, where telecommunications applications are increasingly important. It opened the first of three divisional premises at Ealing in early April.

Merlin's Chief Executive is Gordon Pocock. Organisationally it is one of the four businesses grouped as British Telecom Enterprises – see *British Telecom Journal*, Spring 1983.

Geoff Frosell runs through the operation of the equipment at the Merlin press launch.

The M1100 desk-top visual display unit terminal is supplied with a modem providing automatic dial-up and log-on at the touch of a button. It can access computer service bureaux as well as being able to link Prestel, Telecom Gold and the Packet SwitchStream data service.

using its modem which can store numbers before automatically dialling up and logging on. The modem can also enable the computer to send and receive messages using a computer-based message service such as Telecom Gold. And in addition, when linked to a Puma teleprinter, the M2226 becomes a telex terminal.

Special software has been written for the computer. Known as Merlin Master, it provides an interface for the user and guides the operator to each computing application by simple options displayed on the screen. The M2226 comes with a complete wordstar word-processing package as well as a wide range of applications software including sales co-ordination, mailing list, business administration and financial modelling.

A matching desk-top VDU – known as the M1100 – using the same modem as the M2226 to give automatic dial-up and log-on at the touch of a button, is also available and with the choice of three printers – one daisy wheel and two matrix units – the package can access computer service bureaux, Prestel, Telecom Gold, other mailbox services, and the Packet SwitchStream (PSS) data service.

Completing the initial range is Merlin's M3300 communicating word processor which offers the option of push-button access to the telex network – via a Puma teleprinter – and automatic dial-up to remote databases, computer bureaux, Prestel, and electronic mail services. Keyboard and screen may be adjusted to suit the preferences of all individuals who use it.

The M3300 has 256 Kbytes of storage on two floppy disk drives to make it a powerful and versatile machine. For example, a single keyboard command will instruct it to change one particular word where it occurs, throughout a text, enabling the operator to use short-hand codes for long or tricky words.

It can handle more complex formats – forms, columns (with or without rules), diagrams, flow charts, and newspaper layouts – and acts as a calculator, to add, subtract, multiply, divide and work out percentages.

Key to the success of the range are its communications capabilities. With Merlin products committed to the open systems interconnect principle where it will become increasingly easy to operate systems using different equipment based on common standards, it is clear that the Merlin magic is here to stay.

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International aid

The world's international corporations are to be offered expert help tailored to meet their special communications needs in a new joint service by British Telecom International and Pactel.

To provide this comprehensive service for business customers – which include UK companies with major international links as well as multinational corporations – British Telecom International has joined forces with PA Computers and Telecommunications (Pactel). The project combines the marketing and technical skills and resources of both organisations.

The new service draws on all British Telecom's resources – including those of its Inland Division's National Network Services and its long-standing links with overseas telecommunications carriers – to meet customers' needs. It will also use Pactel's worldwide resources.

It can act as a consultancy, providing advice to corporations on the kinds of communications equipment and facilities that would provide the most appropriate solution to their problems.

The service will carry out detailed network design and supply, install, commission and maintain all the equipment which makes up a network, including international circuits, inland circuits, multiplexors, switches, and terminal apparatus, including local area networks where required, in all the countries concerned.

Libyan deal

Telconsult, the overseas consultancy division of British Telecom International, has been awarded an £8 million contract by the Libyan Posts and Telecommunications Department. The contract, Telconsult's largest single deal, is for the training of 780 Libyan telecommunications students in the United Kingdom. The training will run seven years and will be given by the British Telecom Inland Training Division.

The students will be given six months' English language tuition followed by two years' full time study leading to the internationally-recognised Technical Education Council's (TEC) Telecommunications Certificate.

Guide to Videotex

The Eurodata Foundation has published the Manager's Guide to Videotex – the second book in a series intended to familiarise business managers with developments in telecommunications technology and help them assess the role of new services in their own situation.

The Manager's Guide to Videotex examines this important information processing tool in the worldwide context. Three European countries – West Germany, Sweden and the UK – already have public services in operation and there are plans for the introduction of Videotex throughout most of Europe in the near future.

TAT-8 tenders

British Telecom International, the French PTT, and American Telephone & Telegraph Company (AT&T) are now considering tenders received from three companies for the supply of a laser-powered optical fibres submarine cable system between Europe and North America in 1988.

The system, known as TAT-8 will be owned and operated by a consortium of 28 national telecommunications authorities and commercial companies.

The tenders have been received from Submarcom (France), Standard Telephones and Cables Ltd (UK) and AT&T (USA). British Telecom will contribute 22 per cent of the cost.

Senegal on IDD

Telecommunications between Britain and West Africa have received a significant boost with the start of British Telecom's direct-dialled telephone service between the United Kingdom and Senegal.

Senegal becomes the 128th country on IDD. It joins five other West African countries already linked to British Telecom's IDD network – Cameroon, The Gambia, Ivory Coast, Nigeria and Sierra Leone.

Telcare centre opens

British Telecom's customers can now say just what they think of telephone services following the opening of the first purpose-built Telcare (Telecom Customer Attitude Research) centre at Ilford in East London.

Later this year two more Telcare centres will be opened – at Coventry to serve the Midlands and South West, and at Newcastle-upon-Tyne to serve the North. At least 300 new jobs will result from these projects.

Telcare is the largest customer attitude survey ever undertaken in the UK and demonstrates both British Telecom's concern for its customers and its ability to stay in the forefront of information technology.

Telemessages to US

British Telecom's Telemessage service has been extended to the United States of America.

International Telemessages are sent in the same way as Telemessages in the UK. Customers dial 190 in London, and 100 elsewhere, and dictate their message to the Telemessage service. The message is then forwarded by British Telecom to a local postal office for delivery by mail on the following working day. Business customers have the option of sending

British Telecom International took to the road early in the summer to show local residents in Dorset and Somerset its proposals for a new earth station. The display caravan stopped close to both sites which are being considered and a mini exhibition gave an idea of what an earth station would be like and why BTI had chosen the area. Our picture shows Pat Duffy, head of satellite systems talking to residents about the future role the new earth station would be playing.

Telemessages from their telex machines or from data terminals.

For the transatlantic service, British Telecom will forward messages to Western Union who, operating in conjunction with the US Postal Service, will ensure that an international Telemessage sent from the UK will be delivered to US addresses as 'Mailgrams' – on the following working day.

Boost for motorists

Automatic radiophone sets, which enable motorists to dial calls direct from their cars, are now being supplied by British Telecom for the first time and British Telecom's automatic Radiophone service will be extended to a new south-east zone as the first step in setting up a national automatic network.

This new zone covers Peterborough, Norwich, Cambridge, Ipswich, Chelmsford, Southend, Canterbury, Reading, Guildford, Tunbridge Wells, Brighton and Salisbury. It also takes in the Solent area service started in 1981 which covers Bournemouth, Southampton, Portsmouth, and most of the Isle of Wight.

Automatic Radiophone – first introduced in London nearly two years ago – works more simply and much faster than carphone services in which calls are connected by operators. The user simply presses buttons on the phone in the car and the call is automatically switched through to its destination.

Once connected, the automatic carphone is used just like the phone at home or at work. It is able to make calls direct to any of Britain's 30 million phones, or to the 430 million phones available on international direct dialling to more than 125 countries.

Automatic Radiophone service is now to be progressively introduced to cover most of Britain by the end of this year.

Japanese cable contract

British Telecom International has won a share in a multi-million pound Japanese contract to provide an undersea telecommunications cable linking Bahrain, Qatar, and the United Arab Emirates. Main contractor for the project is Fujitsu of Japan. The British contract is the first BTI has won from a Japanese equipment manufacturer.

Marine Services Division of BTI will use its cableship *Iris* to lay the 280-mile undersea section of the cable on behalf of Fujitsu. The cable will be manufactured in Japan and shipped to Bahrain. CS Iris will lay the cable in five sections, returning to Bahrain for each load. The work will be carried out during October and November this year. BTI's share of the £30 million contract amounts to almost £2 million.

Teletrade success

Teletrade, the specialist export division of British Telecom International, has successfully installed the first City Business System (CBS) outside Britain for the National Bank of Abu Dhabi in the United Arab Emirates.

CBS, a communications system incorporating touch-sensitive display terminals, was developed by British Telecom London's City Area. It was designed especially for financial and commodity dealers.

The Abu Dhabi order will enable the National Bank to establish ten currency dealer positions – eventually to be expanded to 16 – making it one of the largest currency dealing rooms in the Middle East.

Since its establishment 18 months ago Teletrade has sold equipment to more than 40 countries in all parts of the world.

Now it's Telex Plus

Business efficiency has received a boost with the introduction of British Telecom International's Telex Plus which offers a store and forward facility to most countries which can be reached by interna-

tional telex direct dialling (IXDD) and to all UK telex numbers.

Telex Plus will allow UK telex customers to make the most of British Telecom's connections: literally at their finger tips is the largest direct telex network in the world. As well as store and forward Telex Plus offers business users multi-address messages, and pre-recorded addresses (PRA).

New satellite service

News and information is being distributed by satellite for the first time in Europe this summer in a trial run by British Telecom International (BTI), the Exchange Telegraph Company (Extel), and the Department of Industry.

Starting in July, Extel began beaming speech and data to its nine regional offices via the European orbital test satellite (OTS) poised 36,000 km (22,300 miles) above equatorial Africa. The one-way service is being transmitted from a 3.7 m (12 ft) diameter dish aerial on the roof of British Telecom's Fleet building in the City of London, less than 400 metres from Extel's headquarters.

Eleven small-dish rooftop aerials will also be installed at Extel sites in Birmingham, Bristol, Cardiff, Glasgow, Leeds, Liverpool, London and Manchester. These receive-only aerials will be either 1 m (3.25 ft) or 1.8 m (5.85 ft) in diameter.

Detailed technical tests will be carried out at British Telecom's Research Laboratories, Martlesham, and at the Royal Signals Research Establishment at Defford, Worcestershire. The jointly-funded experiment was due to run for three months and will evaluate system design and operating performance giving valuable early indication of the benefits which could flow from using satellites on a commercial scale in the future.

Telemarketing begins

British Telecom's new sales and marketing service, Telecom Telemarketing, began operations in April. It offers special services to a wide range of business organisations, acting on their behalf as telephone representatives and market researchers on an agency basis.

Telephone selling, though not yet widespread, is growing fast. It costs much less to use the telephone than door-to-door selling methods and is more personal than direct mail.

From its base in London, Telecom Telemarketing will operate nationwide. It is the latest addition to Spectrum – that part of British Telecom Enterprises which caters for business customers. It will complement the advanced message handling service, Telecom Tan, launched by Spectrum in February.

US honour

Dr John Midwinter, Special Head of Optical Communications Technology Division at British Telecom's Research Laboratories, has been elected a Fellow of the Institute of Electrical and Electronic Engineers.

A Fellowship is the highest professional grade awarded by this American institution and reflects the worldwide significance of the work of Dr Midwinter and his research team.

Dr Midwinter joined British Telecom 12 years ago having spent three years in the US carrying out research on lasers.

Contracts

GEC Telecommunications has won British Telecom orders for transportable microwave-radio equipment. Worth £4.4 million, the orders cover 19 GHz digital equipments for operation at 140 Mbit/s and at 8 Mbit/s, and 6.8 GHz analogue equipment.

Systems Designers, the first major systems house to hold a full quotation on the Stock Exchange, has won a major contract from British Telecom worth more than £⅓ million to provide an

You're looking at a man on the verge

We'd better explain that while he is healthy enough, his telephone or telephone line may not be.

Now the telephone is undoubtedly today's most hardworking piece of business hardware, so when it breaks down it invariably has disturbing effects on tempers as well as business.

Clearly, being able to locate and correct telephone faults before they actually occur could ease many a tense situation.

The 4TEL system has this ability — it tests and analyses every line in the network every night without fail and tells the telephone company which lines are likely to go out of service before they actually do, enabling them to act promptly and effect a quick repair. It's incredibly fast and accurate using microcomputer control to make 600 measurements a minute. Taking an area with 100,000 subscribers, that's over 2.5 million measurements in six hours.

During the day the system provides a complete range of diagnostic tests on demand, turning out information in plain language on either a VDU or printer. This data helps repair personnel deal with faults faster and more efficiently as they are directed straight to the trouble spot armed with the relevant facts.

alarm handling system for the International Repeater Station at British Telecom's International Switching Centre in London.

Jerrold International Division of General Instrument Corporation has won a further contract for the supply of cable television headend signal processing systems from British Telecom. The contract is for two complete 26-channel, 450 MHz units which will be used by British Telecom as part of its planned expansion into the cable television market.

Standard Telephones and Cables has received a third order from British Telecom, worth a minimum of £29 million, for the Cheetah teleprinter and associated equipment. Orders from British Telecom for the new telex terminal total more than £59 million since the first contract was placed fifteen months ago.

Also a nationwide computerised directory enquiry system worth more than £25 million has been ordered by British Telecom from the Information Terminals Division of Standard Telephones and Cables (STC). The system, which replaces existing microfiche equipment, will give complete national coverage within two years.

Deltak, the leading supplier of multimedia and computer based training programmes for the information processing, communications and office automation industries, have won a contract worth £96,000 from British Telecom for the training of data processing personnel.

Plessey Office System Ltd., have received an order worth £6.4 million from British Telecom for additional Monarch PABX systems. Total business won by Plessey for this product is now £70 million.

Digital Microsystems Limited, has received another order from British Telecom for 96 HiNet™ systems valued at £1.9 million. Digital Microsystems (DMS) has already delivered 120 HiNet systems to British Telecom regional offices throughout the UK for a wide variety of business and commercial functions and for use by repair service centres in London. The latest order brings the total business with British Telecom to almost £4 million.

ACP80 at Manchester

The world's most sophisticated air cargo handling system – an advanced information technology project which uses British Telecom computers – has gone live at Manchester Airport.

The system is called ACP80 – Air Cargo Processing in the 80s – and currently serves Heathrow and Gatwick airports, where it speeds the flow of exports

and imports valued at £8 billion and £9 billion a year respectively.

It will now enable consignments to be handled more quickly and more efficiently at Manchester – Britain's third busiest cargo airport dealing with more than £650 million of freight a year.

Silver and Red go ahead

A talking computer is British Telecom's latest weapon in the fight against the fraudulent use of plastic payment cards. It will be at the heart of Telecom Silver – a new credit card authorisation service for smaller retailers.

Fraudulent use of lost or stolen cards is causing losses of about £20 million per year. To combat this, British Telecom recently introduced transaction telephones which provide an instant authorisation service to large retail outlets with high volumes of credit card transactions.

Developed in co-operation with the card companies, Telecom Silver opened in London in June and will later become progressively available throughout the country.

British Telecom is also launching a new range of security communications systems – Telecom Red – which use ordinary telephone lines to link customers' premises to emergency services. Two services are initially being offered, one in London and the Home Counties, the other in East Anglia.

Telecom Red not only guards against unwanted intruders. It can also send alarm signals in case of fire or medical emergencies, activate personal alarms, and carry out alarm tests.

In East Anglia, customers are using Telecom Red's ABC Alarm System which links their premises by telephone lines directly to emergency services' control rooms. When activated the system takes less than four seconds to alert emergency services.

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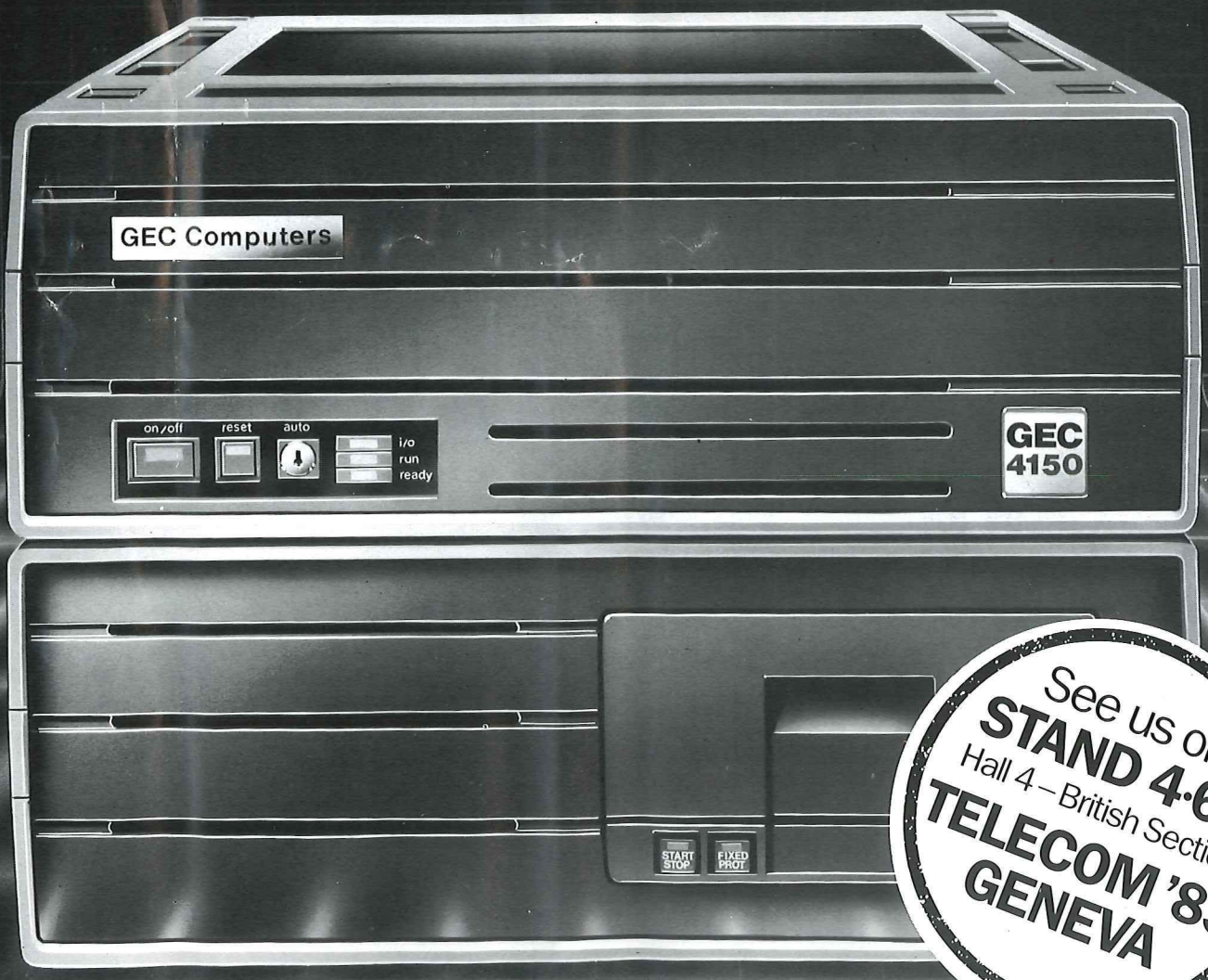

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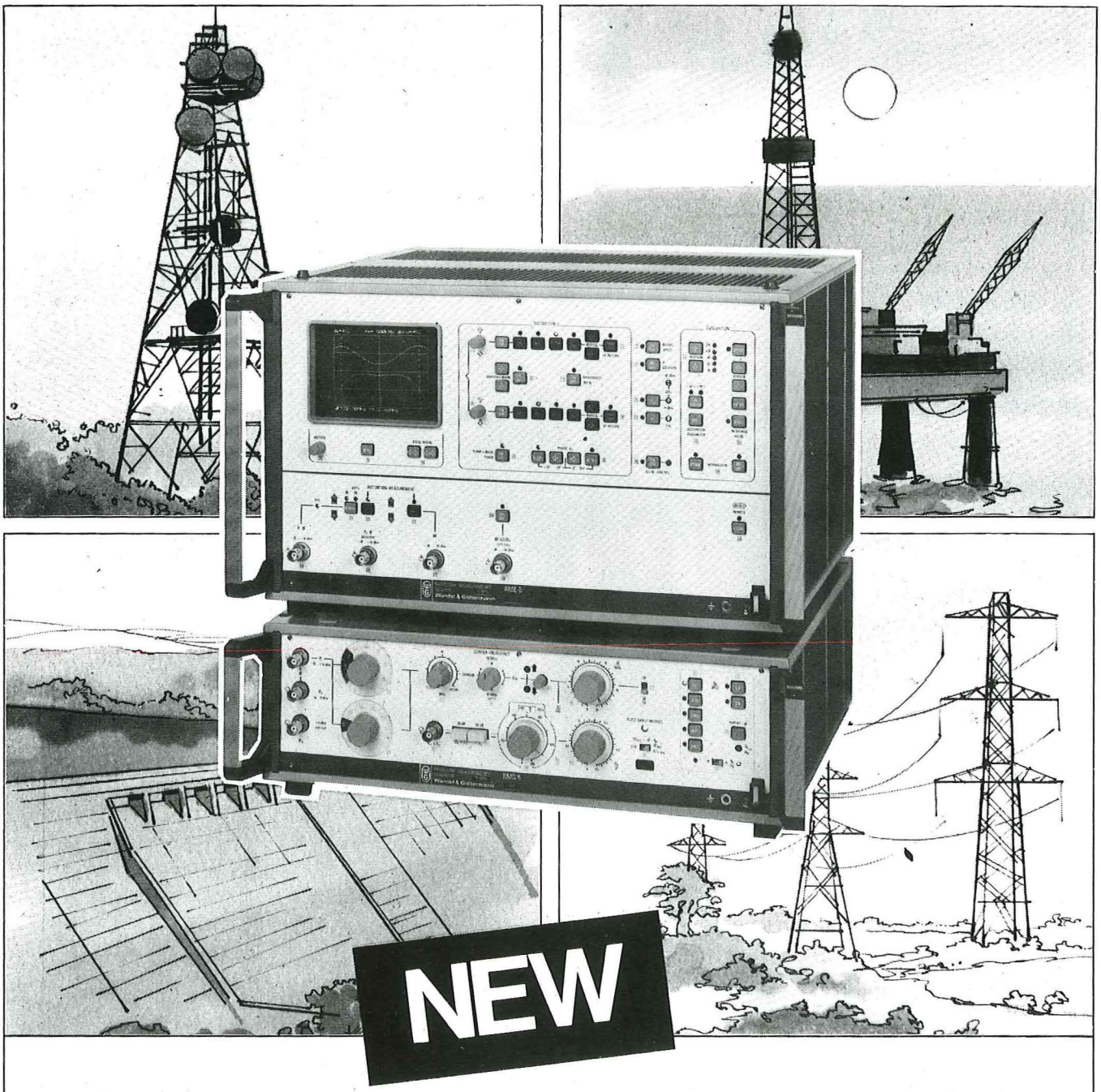

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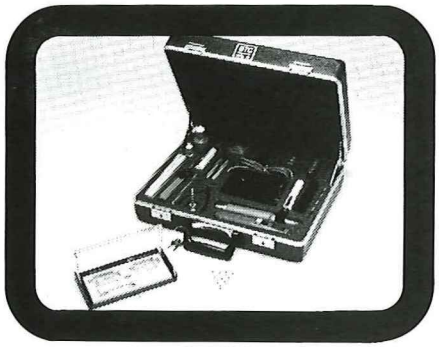

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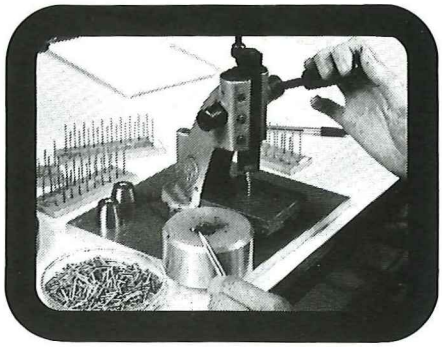

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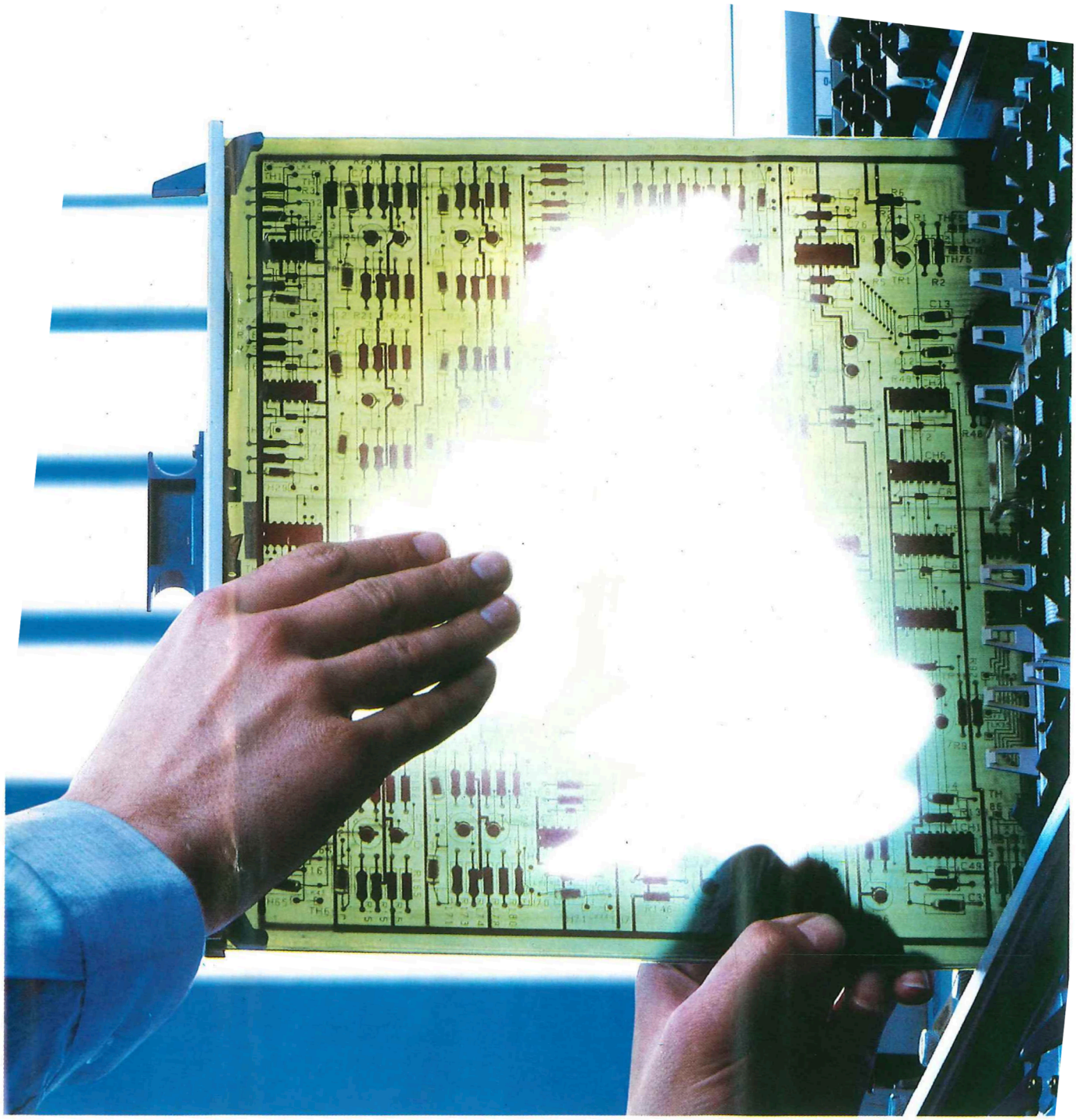

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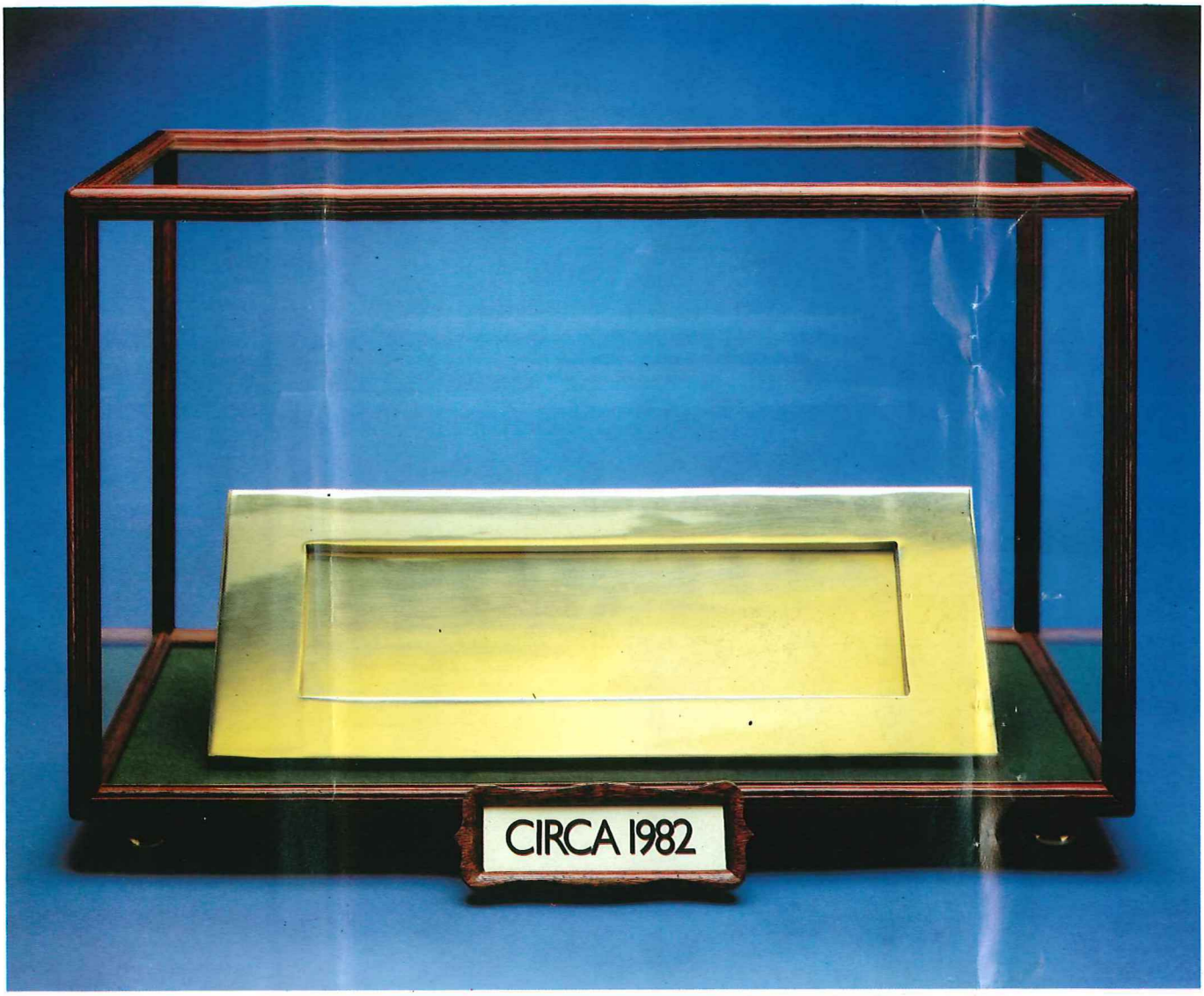

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The service uses your existing terminals to send memos, reports and messages. Delivery to your colleagues' "electronic mailboxes" is virtually instantaneous – whether it's a single letter or a circular memo to 50 branch offices.

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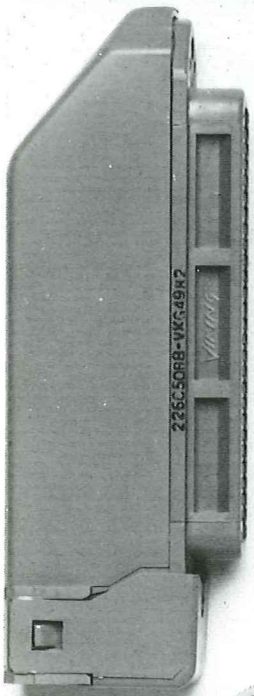

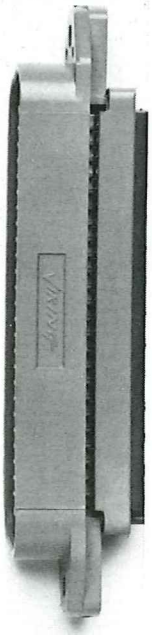

Here is the easy way to meet the stringent Telecommunications Industry standards for connecting cable to cable, cable to panel and cable to PCB... with big savings in time and money.
These connectors utilise insulation displacement contacts which are reliably mass-terminated with power or hand assembly tools, eliminating the need for costly wire preparation.
Vitel F connectors are fully interchangeable with other approved BT 226 connectors and have impact-resistant thermoplastic casings to withstand hostile environmental and mechanical stresses.

Effortlessly

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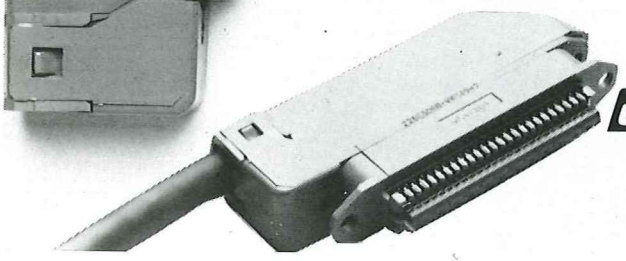

CRITON VIKING

Criton Corporation Electronics and Defence Group

Viking Connectors (UK) Ltd
Barton Industrial Estate
Faldo Road, Barton-Le-Clay
Bedfordshire MK45 4RS
Tel: (0582) 882345/882463
Telex: 825377

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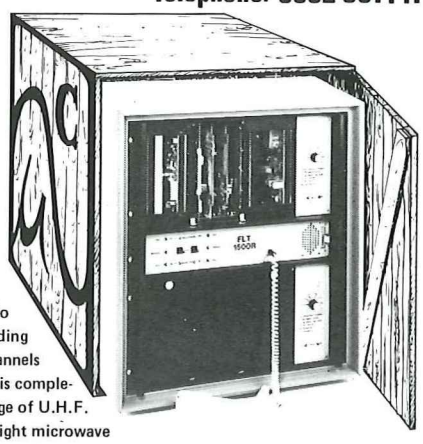

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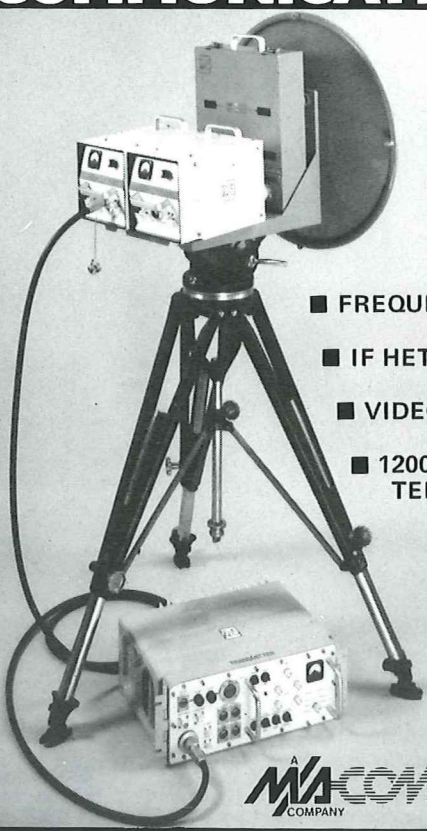

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M-OV's long experience as world leaders in the design of gas-filled surge arresters has permitted us to develop new types to meet the changing needs of modern systems.

And they are many.

So our wide range of BT-approved arresters, installed all along the line for the protection of the world's telecommunications systems and associated equipment, is rapidly becoming still wider.

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The special robust metal-ceramic compression seals of M-OV devices make them far superior in performance, and assure greater long-term reliability, than inferior butt-seal types prone to gas venting problems.

Selecting the appropriate M-OV arrester will provide a permanent solution to your voltage overload problems, and our specialist engineers are ready to advise and help you.

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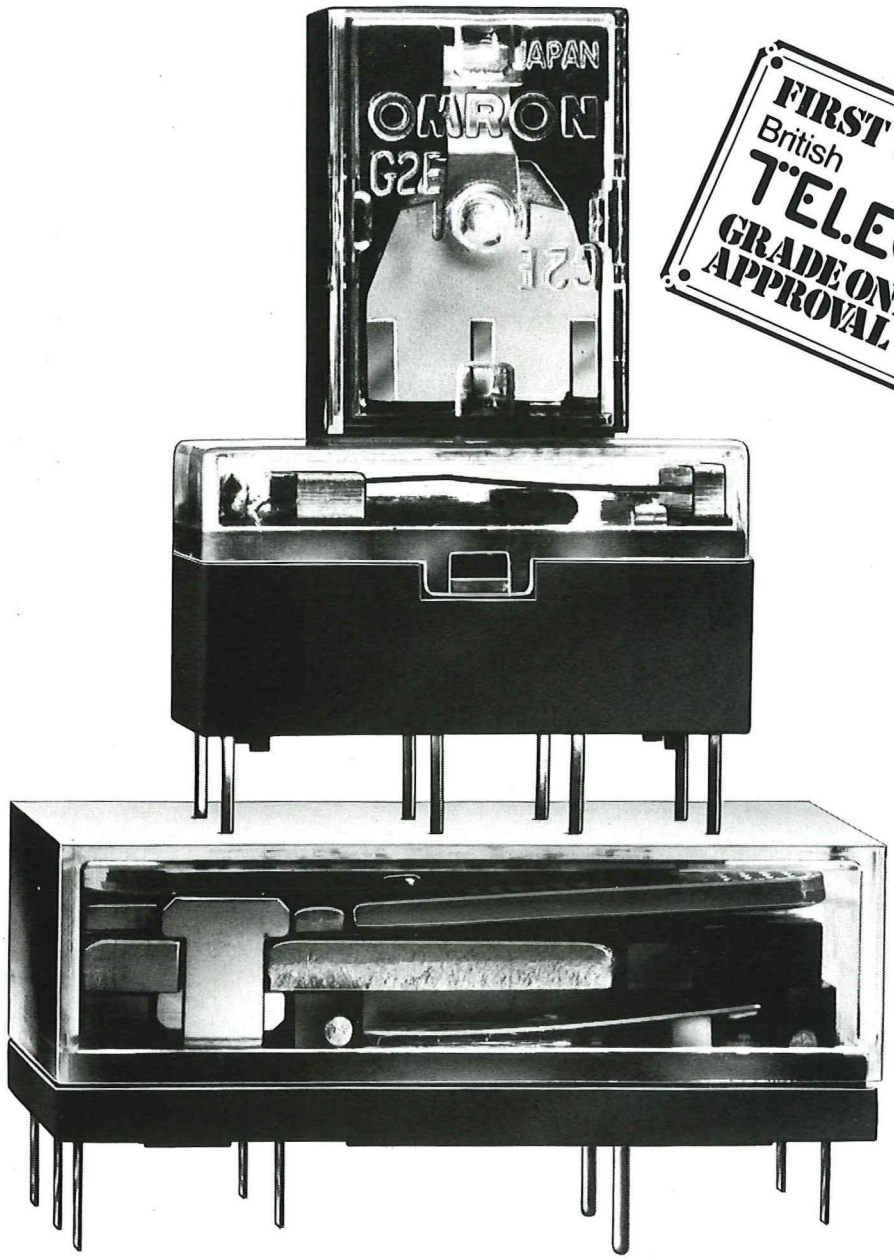

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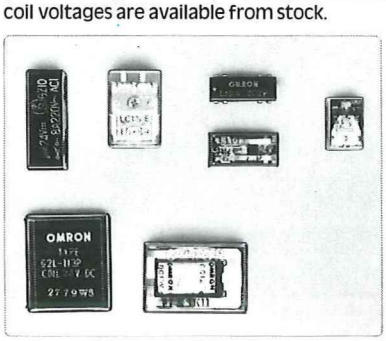

With the increased requirement for complete reliability in electronic circuitry, you'll need relays at the right price and the highest quality.

In a word, Omron–from IMO.

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Much more than you may know

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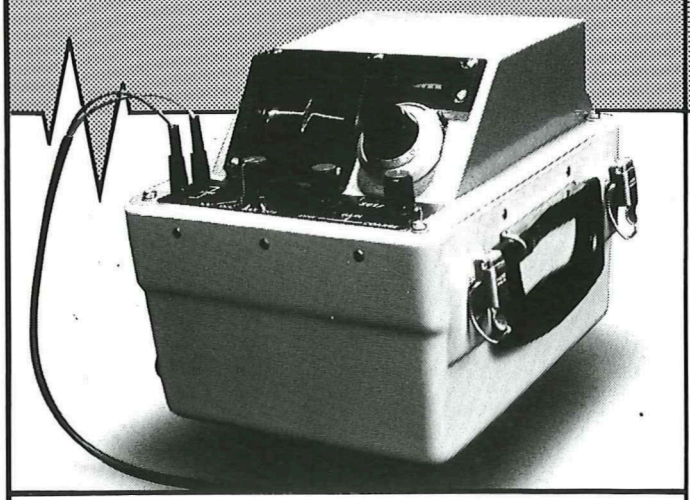


MINI-MOLE

Cable Fault Locator
New 2km version available

There's no hit or miss with this unique, robust and highly portable instrument. In seconds, it pinpoints faults with laboratory accuracy – but it is built as a rugged, simple, every day working tool for use in the field.

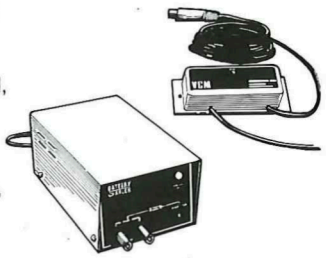
'MINI-MOLE' is British Telecom approved. It has immediate time and cost saving applications wherever underground or above ground networks are vital to communication. To P.T.T.'s it is an essential aid to constantly reliable operation.

Wherever there is a cable – there's a need for 'MINI-MOLE'. In factories, industrial and military installations, in ships, security systems, cable T.V. or any office where computers and electronic systems are essential to efficiency.

BRITISH TELECOM APPROVED

'MINI-MOLE' is battery operated and can be used anywhere – without mains supply. To ensure its constant readiness in the field, a mains battery charger and an in-vehicle charger module are available options.

'MINI-MOLE' finds faults quickly, accurately, simply and economically.



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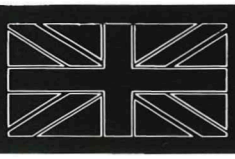

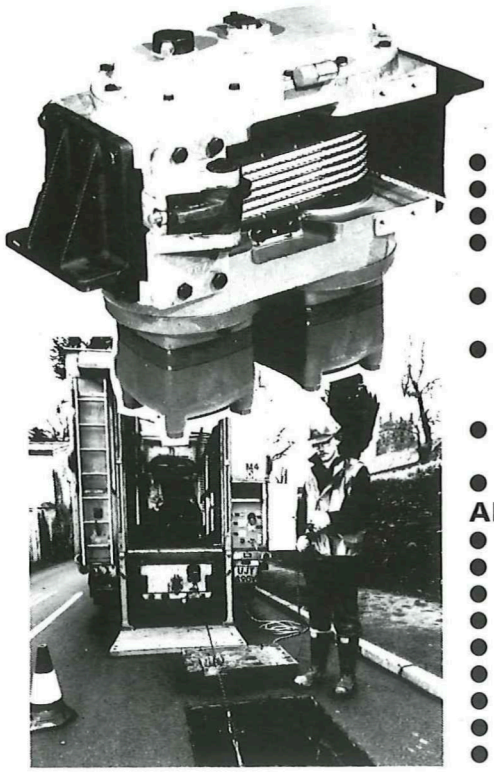

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- Infinitely variable speed control.
- Extremely sensitive inching facility even under full load.
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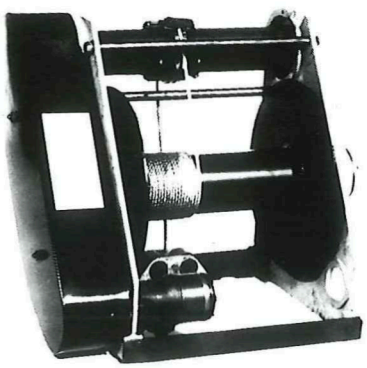
- Fixed tension on storage drum, independent of load at capstan, gives correct lay of cable without crushing or pinching ensuring longer cable life.
- Winch unit can be mounted independently of storage drum leaving floor space clear for personnel, payload, etc.
- Multi-direction pull.

APPLICATIONS

- Underground cable laying
- Power line construction
- Forestry
- Recovery
- Civil engineering
- Mining
- Oil industry
- Marine
- Military use



For details on our full range of winches please contact:

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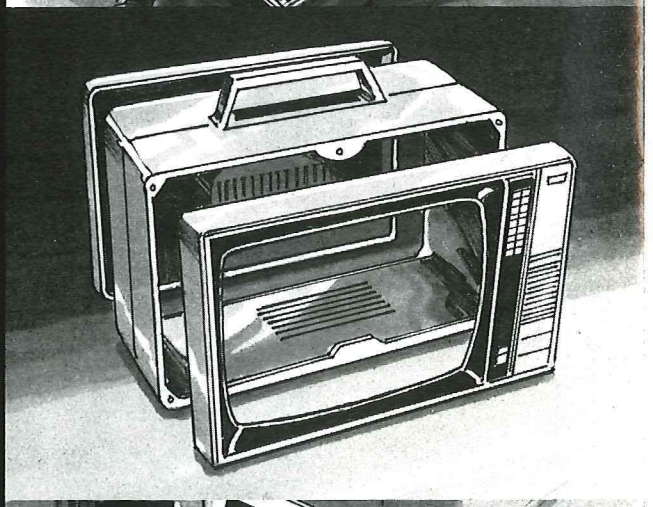

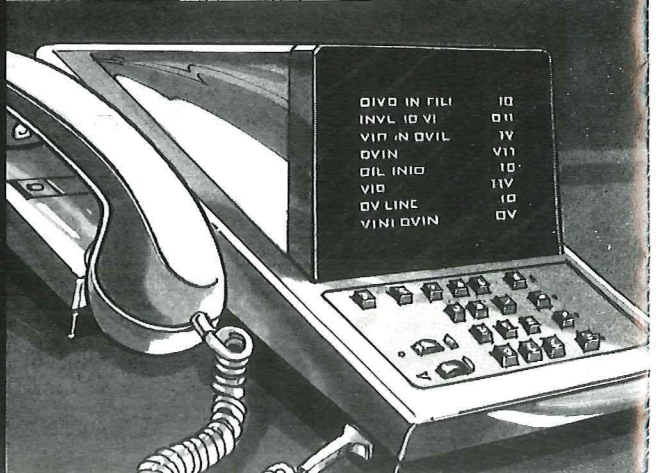

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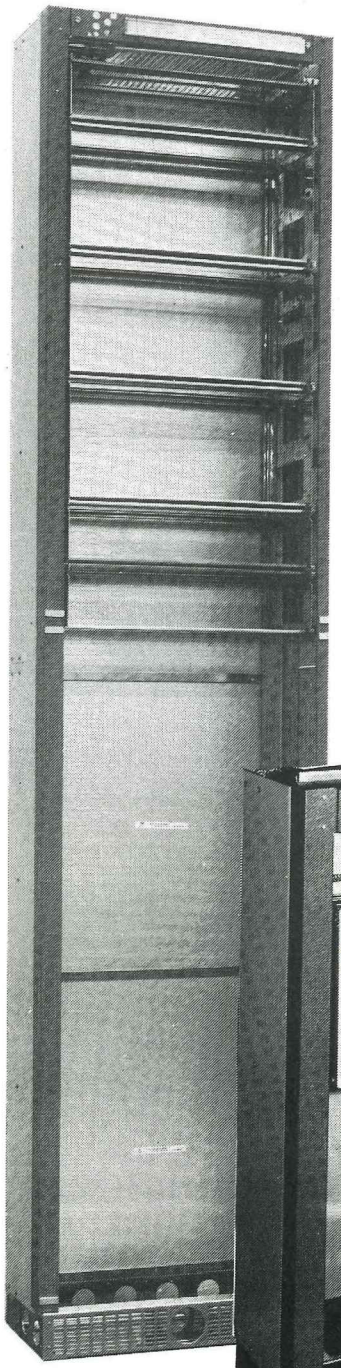

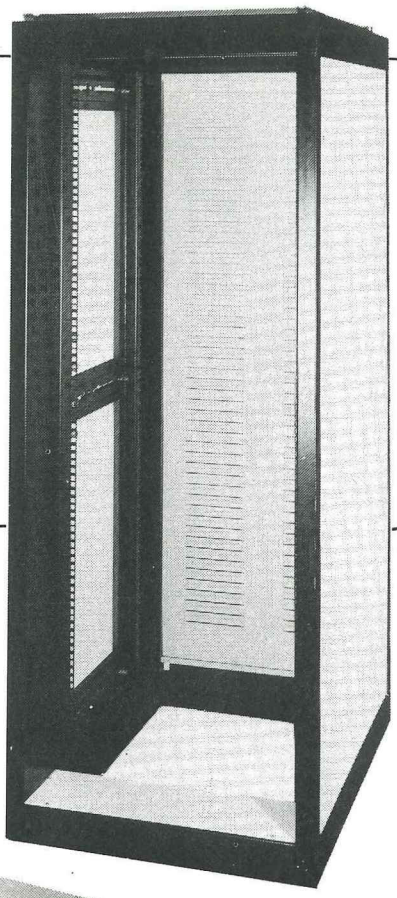

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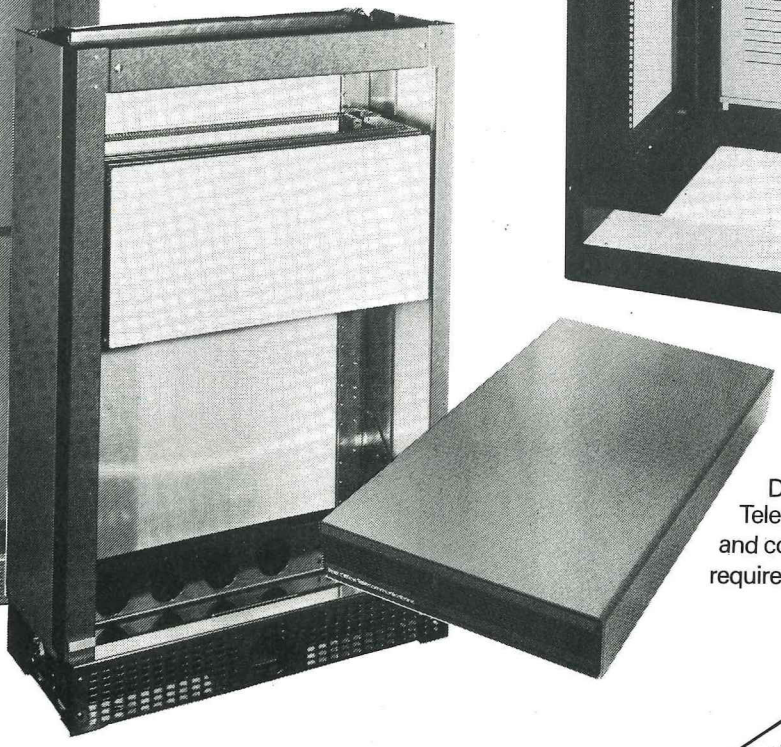

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